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Strengthening Drought Resilience of the Pastoral and Agro-pastoral Populations in Arid and Semi-Arid Lowlands in Ethiopia (SDR-ASAL

Fodder Market Assessment (GIZ) Report of Harorays, Shabeleay, Shinile, Erer and Gode Districts of Ethiopian Somali Regional State

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Acronyms

ADRA Adventist Development and Relief Agency

AIBP: Agro –Industrial by Product

ANRDB: Agriculture and Natural Resource Development Bureau

ANRDO: Agriculture and Natural Resource Development Office

ATA: Agricultural Transformation Agency

ATMR: Activated Total Mixed Ration

CP : Crude Protein

CSA: Central Statistical Agency

DAs: Development Agents

DM: Dry Matter

ESRS: Ethiopian Somali Regional State

FAO Food and Agriculture Organization

FGD: Focal Group Discussion

FTC Farmers Training Center

GIZ: Deutsche Gesellschaftfür Internationale Zusammenarbeit

HCS: Haraghe Catholic Secretariat

INGOs: International Non-Governmental Organizations

LPDB: Livestock and Pastoral Development Bureau

LPDO: Livestock and Pastoral Development Office

ME: Metabolizable Energy

MNB: Multi Nutrient Blocks

MoARD Ministry of Agriculture and Rural Development

NGOs: Non-Governmental Organizations

OWDA: Organization for the Welfare Development Association

PWO : Pastoral Welfare Organization

SCI : Save the Children International

SoRPARI : Somali Region Pastoral and Agro-pastoral Institute

SOS -GCV: SOS Gode Children's Village

TVET : Technical Vocational and Educational Training

VCA: Value Chain Analysis

VSF-Suisse: Veterinary San-frontiers- Switzerland

WFP: World Food Programme

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Section-I: Executive Summary of the study

1. Executive summary

This study was commissioned by GIZ (Deutsche Gesells Chaftfür Internationale Zusammenar beit) to assess and identify the prioritized importance of the key constraints faced by key actors, farmers and pastoralists engaged in fodder production and marketing in the study sites of Harorays, Shabelay, Shinile, Erer and Gode districts of Somali Region. The study districts are located in Fafan, Sitti and Shabelle administrative zones of Ethiopian Somali Regional State (ESRS). The fodder market assessment study is intended to serve as a basis for developing implementable activities to improve food security through Disaster Risk Reduction and build resilience to natural shocks, food and economic insecurity.

The report is divided into six major sections. The first section which is the **executive summery** part reviews the overall study findings and focuses on the indentified interventions and section two is about **introduction/background** and discusses about the general overview of the country, Region, and also presents concise back ground information of the study Districts/Woredas. Section three of the report discusses about the **objective of the study and various methodologies** employed during data collection. Section four of the report presents **analysis of the information and data** gathered during the study. Section five of the report presents **the findings of the Fodder Market Assessment** and lastly section six presents the **identified constraints and concussions** to address those constraints and identified challenges.

The region in general and the study area in particular is characterized by erratic and unpredictable rainfall pattern, severe land degradation due to soil erosion, overgrazing, deforestation and most seriously recurrent droughts and floods. Generally, the study area is categorized in to Agro pastoralist livelihood system.

While both livestock and crop husbandry are equality important to the economy of the Agro pastoralist community, fodder is one of the most important determinant factors for the survival and productivity of livestock which consequently maintains the livelihood of the local community. For food and fodder crop production, the main source of the water in the study area are rain fall,

seasonal streams (Erer) , ground water (Borehole) and natural springs (Shinile) and perennial Rivers like Wabe Shabelle River (Gode). While farmers in Shinile and Erer use Boreholes, Natural springs and Seasonal streams, the farmers in Shabelay and Harorays district do not have access to water for crop irrigation other than rainfall. Moreover, farmers in Gode have access to irrigation water from the nearby Wabe Shabelle River through and lift water by water pump of various size. Obviously, in Shinile district and similar districts in Sitti zone, water is lifted from the Boreholes by the help of electric power supplied by the Ethiopia Electric and Power Authority to irrigate crops.

While maize and sorghum are primarily produced for subsistence, vegetables such as onion, tomato, and green paper, watermelon including fruit trees such as papaya, lemon, banana, guava and mango are market oriented. Onion, sesame, tomato, banana, lemon and Sudan grass are also produced in Gode area as cash crops. Similarly, some vegetables such as tomato, onion, fruit trees and Khat (stimulant) are major cash crops in Shinile, Erer, Harorays and Shabelay districts in various magnitudes. Nevertheless, fodder production, processing and marketing activities in the region in general and in the study area are faced with multifaceted challenges and the need to improve it is mounting.

Aggravated by the recent El Nino induced severe drought of 2014/2015 in Sitti and Fafan zones and the La Nina induced severe drought of 2016/2017 in the remaining zones, the region has faced severe shortage of fodder ever in 50 years. It is in this context that the Fodder market Assessment and fodder value chain study is initiated by GIZ in order to build the resilience of the vulnerable community in the five target districts. The study has been conducted in a total of 10 Kebeles i.e. two purposively selected Kebeles from each of the five districts namely Yosle, Lamadaga, Shabelay (01), Amadle, Harawe, Baraq, Fathuli ,Qandaras, Badila'd and Kunka of Harorays , Shabelay , Shinile, Erer and Gode districts respectively.

Therefore, the focus of the study is description and analysis of the fodder market functioning, constraints and fodder value chain development potential. Utilizing a combination of mapping technique and gross margin analysis, the study attempts to identify the relative importance and the negative obstacles to the fodder sector development and marketing as the result of the constraints.

Although the information presented is conditioned by data limitations, it provides a guide to the categories of constraint that are the most likely hindrances to the fodder sector development and marketing in the study area. The comparative importance of the different constraints identified gives ***an indication as to where to target initial activities so as to ensure an appropriate and sequential alleviation of constraints.***

Some of the key fodder production and marketing activities identified in the study area consist of two categories (1) Fodder produced and Marketed within the study area which include but not limited to production and marketing of **Natural Pasture Hay**, **improved Grasses fodder** (Such as Sudan Grass and others), cereals of green fodder of maize and sorghum, cereal residue of maize and sorghum, wheat bran, Multi Nutrient Blocks (MNB), Activated Total Mixed Rations (ATMR), Sesame Oil Seed Cake, and (2) Fodder supplied to the Somali Region during the drought emergencies of 2016/2017 particularly induced by La Nina episode of the horn of Africa which include but not limited to baled Natural Pasture Hay , Urea, Molasses and Beggasse, ATMR , MNB, and Sudan Grass in the form of silage or bales. There is no recoded data on the fodder produced by the agro pastoralist, cooperatives and enterprises in the study area. However, government record shows that about 250,000 bales of natural grass hay were supplied by the federal and regional government to the aforementioned drought. For the 2016/17 drought alone , FAO has supplied over 100 trucks of Bagasse, 224 quintals of Urea, and 400,000 liters of Molases, 70,000 pcs of MNBs, and 4,800 quintals of ATMR. Other NGOs such as SCI, VSF-Suisse, Mercy Corps, AAH (former ACF), Oxfam GB, Islamic Relief etc have supplied huge quantities of fodder mainly consisting wheat bran and Sudan grass. Except Sudan grass which has been supplied by NGOs and the regional government to the drought affected areas from cooperatives in Berano District (West Gode Irrigation project area), all the above fodder types have been transported from highland areas of the country in which the Hay of the natural pasture was transported from Sululta (near Addis Ababa) , the Begasse and Molasses from Matahra, ATMR from Addis Ababa wheat bran from flour factories in Dire Dewar, MNBs was supplied by Afar region and Erer district joint cooperatives. This indicates the low level of production of fodder in the region. There is also enterprise one cooperative in Erer town which produce MNBs and one private enterprise which produce formulated feed such as ATMR and MNBs in Jigjiga town. In Gode there are at least three sesame processing mills which produce sesame oil seed cake where as one is belong to a cooperative and the remaining two belong

to private individuals. Although is better in terms of efficiency and value addition which involves proper packaging and labeling , the cooperative one is not functioning due to lack of raw material.

Generally, all the wheat bran producer factories, the ATMPR , MNB and sesame oil seed cake plants are operating at 50% of their capacities due lack of raw materials and market related challenges. There are many traders in Jigjiga town who purchase wheat from factories and sell wheat bran to agro pastoral community. They purchase with 600 birr/qnt including transport and sell with 650 Birr/qnt.

The study also showed that there are neglected fodder types such as wheat residue in Harorays and Shabelay districts and the leftover of Khat, a stimulant plant produced in Harorays, Shabelay, Shinile and Erer but also supplied mostly from Oromia region in bulk quantity to different areas of the region. While almost 100% of the residue of wheat in Harorays and Shabelley districts is lost without using as fodder, the leftover of Khat is widely used and consumed by goat and sheep every day in almost all study districts particularly in towns and large rural villages with certain amount of loss. Experience in other regions of the Ethiopia indicates, residue of wheat can be made in to hay and the left over (leaves) of Khat can be consumed fresh or collected, conserved and packaged for marketing to use as livestock feed during dry season or drought period.

Evidently, fodder availability and the livestock productivity are directly related factors. The average land holding per household in the study area was 1.67Ha/hh which is higher than the national average figure of 1.18 Ha/hh (CSA, 2011). This might be due to the recent settlement programme of the government which moved pastoral community in irrigated areas gave access to comparatively larger land holdings. The study showed that out of the total cropped area in the five study districts, only 26% of the cropped area was used for forage crops such as maize, sorghum, sesame and Sudan grass. Obviously, there is some variation among the study districts where Gode, Shinile and Erer districts were higher with 45%, 32% and 22% respectively as compared to Harorays 18% and Shabelay 13%. Similarly, forage area per household of the study districts was nearly 0.50 Ha (half Ha/hh) where as there was variation among the figures in the five study districts where Gode, Harorays and Shabelay districts were 0.80 Ha/hh , 0.60ha/hh and 0.50Ha/hh respectively and the figure for Erer and Shinile was much below 0.50 Ha/hh. Gode, Harorays and Shabelay districts

have showed higher figure of forage yield of 15,382.50 Kg DM/Ha, 13,361.22 KgDM and 9,798.14 KgDM as compared to Erer and Shinile districts of 6,922.27 KgDM and 6,630.33 KgDM respectively.

However, the actual yield of fodder in the study districts is much below the above figure as the area allocated for forage is below 1 Ha/hh in all the study districts which is also the other reason for the low production level of fodder in the region. The average milk production per cow was 1.03 Litter per day. This is a low quantity as compared to **the national average of 1.5 liters** per cow per day (CSA, 2012).

This is attributed to poor quality and quantity of feed, lower ME, CP and DM intake of the available fodder resources coupled with poor breed of the livestock on the study area. Generally, the study showed there were similarly in the quantity of milk sold by the households across the study districts and the average milk marketed was 74.74% of the total annual milk produced. The higher figure was observed in Shabelay, Gode, and Erer districts with 77%, 76% and 75% respectively followed by Harorays and Shinile districts with 72% each. Largely, Shabelay, Shinile and Gode districts showed higher annual income from milk sells with 33,573.10 birr, 32,093 birr and 29,531.42 birr per household as compared to Erer and Harorays districts with 21,787.32 birr and 17,258.27 birr per household respectively. This might be due to better access to the large cities such as Jigjiga, Dire Dewa and Gode , availability of supplementary feed and better access to market for milk as well.

By and large, Harorays, Shabelay and Shinile districts spend 49%, 46% and 32% of the annual income earned from milk sell for fodder purchase as compared to Erer and Gode which spend 25% and 14% of the annual milk income respectively whereas, this might be attributed to the existence of better supplementary feed obtained from irrigation schemes in Erer and Gode districts coupled with availability of grazing areas for livestock.

Consequently, some of the key recommended interventions in the short, medium and long term which is believed will foster the fodder sector development and marketing among others and perhaps to solve the identified constraints are discussed as follows:-

A. Key Interventions Required at the Fodder Production Level

(1) Assist the strengthening of existing ***fodder producers cooperatives and unions*** in the region and support the establishment of new fodder producers cooperatives and enable them increase production and marketing of fodder, (2) In collaboration with Regional and district Agriculture Bureau and Offices respectively, support on strengthening of the current ***weak Agricultural extension system in the region through building capacity,*** (3) Assist in improving access to sustainable forage seeds through establishment of improved ***forage seed bank or seed multiplicati*****on** for fodder production in all study districts , (4) Agro pastoral areas that mainly depend on rain fed Agriculture such as Harorays and Shabelay areas require support for the cultivation of short cycle forage varieties including support for creating access to irrigation water through ***water harvesting (Hafier Dam) and Hand Dug wells (Shabelaly)*** (5) Due to the seasonality of stream flow in Erer district, development of alternative water sources such as ***Borehole and Hafier Dam is required*** (6) Support on ***Spate Irrigation management technique*** for fodder cultivation in Agro Pastoral areas such as Harorays, Shabalay districts and scaling up of results to many similar districts in the region that have potential for **rainfall run off moisture agriculture is required**, (7) In irrigated areas along **Major Rivers** such as Gode district, support training program to create /irrigation ***water pump maintenance skills*** among the farming community (train village pump technicians), (8) In Borehole dependent areas of the region like Shinile District (example Harawe and other Kebeles), in coordination with the Water Bureau of the region, solve the deliberately frequent power shutdown problem that is made by Ethiopian Light and Power Authority, (9) Support to create access to ***Irrigation water pump spare parts,*** through involving the private sector or farmers cooperatives managed irrigation pump spare part supply system, (10) In irrigated areas, provide irrigation water management and support with ***geo-membrane installation to minimize water loss due to seepage*** of irrigation canals and also expand the canal systems in Erer and Shinile particularly in seasonal stream and natural spring dependent areas ,(11) Provide hand ***tools and tractors*** for tillage/minimum tillage and support forage crop protection including ***crop protection support through Integrated Pest Management System*** (IPMS) ,(12) Support farmers on trainings related to post harvest fodder management and preservation technique particularly natural pasture hay, maize, sorghum, residues , Sudan grass and sesame oil seed cake and ensure quality through appropriate storage system (13) Assist the sustainability of fodder producer farmers or cooperatives and particularly assist in establishing

Water Users Association (WUAs) in irrigated areas for the sustainability of irrigation schemes and provide the necessary training to the WUAs including supporting legalization from the region and development of WUAs bylaws to enable WUAs collect fee from members for purchase of seeds, maintenance of irrigation pumps or systems, and purchase of fuel for water pumps users and enable WUAs work closely with the cooperatives as well for the supply of inputs and sells of the fodder, (14) Support on experience sharing on fodder production and management technique in other parts of the country, (15) Strong advocacy on a more inclusive fodder production with a better understanding of challenges of women and youth in the region is required, (16) support in the control or eradication of invasive species (Prosopis Joliflora) particularly in Shinile, Erer and Gode districts, (17) to increase soil fertility , support water and soil conservation focusing on water shed management techniques through structural, physical , biological and institutional methods.

B. Intervention Required at the Fodder Processing, Storage and Transportation Level

(1) Support the improvement of fodder ***preservation particularly on natural pasture hay, sorghum, maize and wheat residue through making hay or silage and bales*** and encourage use and preservation of leftovers of edible plants such as banana leaves, watermelon, leaves of Khat plant etc, (2) Assist the improved ***processing, packaging and grading of sesame oil seed cake*** and support production of more sesame to produce more oil seed cake as a fodder and also train on value addition, (3) Create access to efficient ***sesame oil seed processing technologies / mills*** and enable processers to use the ***current opportunity of expanding national Grid*** particularly in Gode area, (4) Support through training of farmers and cooperatives in hay making from natural pasture, improved grasses and crop residue such as maize, sorghum, and wheat and ***train producers on value addition of different fodder types,*** (5) Assist and provide fodder ***transportation materials/equipments such as donkey carts and tractors*** based on needs of the specific locations, (6) Enhance farmer's awareness on product quality issues to avoiding ***contamination of fodder by fuel during transportation***, exposure to rain and protection from fungus and pest attacks),(7) Support and create access to fodder storage facilities to local fodder ***producer cooperatives and farmers including fodder banks***, (8) Collaborate with the regional Livestock and Pastoral Development Bureau on the quality of fodder at every level of the value chain focusing on ***the issue of Aflatoxin particularly on sesame oil seed cake, wheat bran and middling, ATMR, MNBs and crop residues*** as well and lastly create awareness on feed contamination both at farmers,

cooperatives, processors and industry level and work on fumigation (disinfecting the raw materials or product).

C. Interventions Required to Overcoming Constraints at the Marketing Level

(1) Establish a mechanism for systematic collection and provision of up-to-***date market information /intelligence on prices, demand and supply of fodder products***, (2) Assist on improving ***coordination between relevant partners involved in the livestock and fodder market development sector,*** (3) Support in improving the linkage between ***producers, traders and consumers of fodder*** in different parts of the region to avoid overproduction and market flooding of particularly Sudan grass, green fodder of maize and sorghum due to the farmers focus on production of fodder for emergency period, (4) ***Conduct market assessments periodically*** to update market information and identify new potential customers , (5) Identify potential customers (***Institutions, NGOs , fattening lots , livestock traders , in different towns etc)*** and establish contract based linkages so that producers could directly sell to them, (6) ***Creation of business environment and support on Agri-Business skills and knowledge for farmers and cooperatives*** to make them competitive in national and international markets through establishing linkage among value chain operators, supporters and enablers ,(7) ***Identify and establish cooperatives that are specialized in fodder marketing,*** (8) Identify and create access financial services and credit facilities and ***link fodder producer cooperatives and traders and link to local microfinance*** institution, organize workshop at Jigjiga to create such linkage (9) Supporting the production of ***livestock for commercialization such as livestock traders, dairy, poultry etc*** to foster the fodder marketing in the region, (10) Build the capacity of the existing fodder producers and marketing enterprises such as TMR and MNB enterprises and support the establishment of new enterprises in potential areas of the region through direct investment support or linking with the MFIs (Micro Finance Institutions).

D. Cross Cutting Issues

The Cross Cutting Issues consists of different activities that create the conditions for achieving the fodder production and marketing objectives of relevant stakeholders in Somali Region in general and in the study area in particular. These issues include but not limited to (1) **Cooperative and farmers' entrepreneurial Capacities** ; Explicitly target cooperatives for collaboration as cooperatives supply inputs for the fodder production (2**) Training and extension** ; intensive collaboration with regional

Agriculture and Natural Development Bureau, Regional Research Institute for the trainings Trainers (ToT), training of DAs, model farmers and support in the preparation of Fodder production and marketing manuals or module in Somali Language is required , (3) **Communication** ; In an attempt to increase information flow, dialogue and understanding as well as to raise awareness of Fodder Production and Marketing, stakeholders, partners and all concerned bodies about the overall activities in the Fodder value chain, effective and efficient communication is mandatory and therefore , the communication channels that the Fodder Production and Marketing can use for dissemination and communication of activities and results include the Fodder Production and Marketing newsletter, Fodder Production and Marketing, social media such as Face book and twitter, short films, mobile cinema, radio and posters. (4) **Strategic innovation;** this also includes issues such as **Market linkages and sales** - Market system innovation, - Getting orders before production season and translating buyers specifications in production decisions, **Yield and quality improvement** - seed multiplication, alternative crops and crop rotation for sustainable fodder production systems -Adapted recommendations for integrated soil fertility management, **Credit cost reduction** - Farmers' financial literacy, economic analysis and saving culture - Cooperative management and internal resource Mobilization - Rating cooperatives (advanced certification; creditworthiness) - Improved linkage of farmers and cooperatives to MFI's and banks - Development of financial - Pest and disease management **and Policy implementation which includes** - Implementation corridor and cluster approach for fodder production - Rating cooperatives - Direct sourcing of processors of fodder such as sesame oil seed cake, ATMR and BNBs and other AIBPs - Direct export cooperative unions in the long run to the neighboring Djibouti, Kenya, Somalia etc and (5) **Monitoring and evaluation by stakeholders or livestock feed working group** ; The objective of the Fodder Production and Marketing is to arrive at competitive, sustainable and inclusive Fodder value chains where specific attention is given to these three aspects: - Competitiveness: cost price analysis - Sustainability: crop rotation and sustainable production (rotation of cereals with legumes such as sesame with maize or sorghum and so on) - Inclusiveness: specific attention and targeting for small farmers, young and female farmers and sensitivity to labor conditions, income etc.

Section-II: Introduction and Back Ground Information

2. Introduction/Back ground

2.1 Overview of Country Context

Subsistence livestock production constitutes a very important component of the country's agricultural economy accounting for 16% of the total GDP and over 40% of the agricultural GDP, 15% of export earnings and generates 30% of the agricultural employment. Moreover, livestock are estimated to contribute to the livelihoods of 60%-70% of the Ethiopian population. More interestingly, the livelihood of pastoralists is dependent on livestock. Pastoral areas cover 60% of Ethiopia and include 12%-15% of the human population, as well as very large number of livestock. Despite its contribution to the economy and small holders' livelihood, the production system is not adequately market-oriented and livestock productivity remains very low due to various constraints that include poor nutrition and disease prevalence. These problems are compounded by inefficiencies in the input (feed, genetic material and veterinary services) and output (livestock and livestock products) marketing, including poor market infrastructure, lack of marketing support services and limited market information.

Among these constraints issues related to feed are the most remarkable ones. Feed shortage in quantity and quality has been a critical problem in Ethiopian livestock production system. The single largest expense in animal production is feed cost and it dictates feasibility of livestock enterprise. Overall, among the dominant factors contributing to the feed shortage both in terms of quantity and quality is the poor feed marketing system characterized by poor market information, localized thin markets and limited premium price for quality. A review of past research works indicated that animal feeds and nutrition research largely concentrated on biological aspects both on-station and on-farm. If adoptions of animal nutrition technologies have to be optimized on the on-farm, feed technology development should be accompanied by efficient feed market system.

An efficient feed marketing system is rewarding both for marketing agents and livestock producers. So far, very few studies have addressed issues of feed supply and marketing in Somali Region. Moreover, information concerning livestock feed demand and supply, feed quality issues, feed marketing, feed prices, price trends are scarce. This study is aimed at assessing the feed marketing systems in Ethiopian Somali Regional State (ESRS) in general and in selected districts of Somali

Region (Harorays, Shabelay, Shinile, Erer and Gode) in particular, to analyze and generate a qualitative understanding of the feed demand and supply situations, feed quality issues, feed marketing, feed prices and price trends. In a nut shell, Ethiopia has the largest livestock population with following constraints:

- Uncontrolled grazing
- Degradation of pastureland
- Soil erosion,
- Deforestation
- Declining soil structure and fertility
- Social and economic conditions

2.2 Overview of Regional Context

Ethiopian Somali Region State (ESRS) is the second largest region of Ethiopia and occupies over 350,000 km^2 stretching out between 4° and 11° N latitude and 40° and48° E longitude at the south eastern part of the country. Majority of the region is plain low land with altitude ranging from 300 to 1600 asl.

The projected population of the region is over 5.5 million (CSA 2013) of which 85% live in rural and rely on livestock production and products as their major sources of livelihood. Population density of the region is estimated about 15 person/km^2 dispersed across 1220 major administrative Kebeles structured under 93 Woredas and 11 zones. Although underdevelopment has been the twin sister of the region in the past due to deliberate negligence by the previous successive regimes of Ethiopia, progressive development efforts are underway in recent years.

Endowment of over 32 million livestock population, the region is predominantly pastoralist with limited agrarian practices in Riverine and semi high land areas. With a scorching temperature that ranges between 25° to 45° , the annual mean rainfall of 300 to 600mm renders the region with uncertain rainfall variability. The region is thus characterized by erratic and unpredictable rainfall pattern, severe land degradation due to soil erosion, overgrazing, deforestation and most seriously recurrent droughts and floods.

Figure 1: Map of the Ethiopian Somali Regional Sate

Table 1: The disaggregated livestock population of the region

S/N	Zone	Livestock Population of The Region By Species						
		Cattle	Sheep	Goat	Camel	Equine	Total	Remarks
1.	Fafan	946,182	1,619,670	630,646	31,583	42,000	3,270,081	
2.	Siti	441,165	1,123,676	893,031	78,415	46,000	2,582,287	
3.	Nogob	487,601	689,221	773,346	80,592	18,000	2,048,760	Nogob & Erer zones combined
4.	Jarar	555,325	662,145	660,568	62,077	11,000	1,951,115	
5.	Korahay	325,069	1,415,365	827,435	299,496	6,000	2,873,365	
6.	Dolo	530,171	1,688,591	2,255,594	522,757	5,000	5,002,113	
7.	Shabele	777,844	1,235,676	731,917	15,247	8,000	2,768,684	
8.	Afder	1,905,908	1,515,054	906,845	83,858	14,000	4,425,665	
9.	Liban and Dawa	1,375,737	1,192,599	2,156,623	1,038,977	63,000	5,826,936	Liban & Dawa
	Sub Total	7,345,002	11,141,997	9,836,005	2,213,002	213,000	30,749,006	
10.	**Sub Total**	**Poultry**					**1,200,000.00**	
11.	**'Sub Total**	**Haney bee colony**					**60,000.00**	
	Grand total						**32,009,006**	

Source- ESRS/LPDB, 2015

Generally, more than 75 % population in Somali Region depends on livestock with serious feed problem both in quality and quantity and totally depends on natural grazing land that experiences a

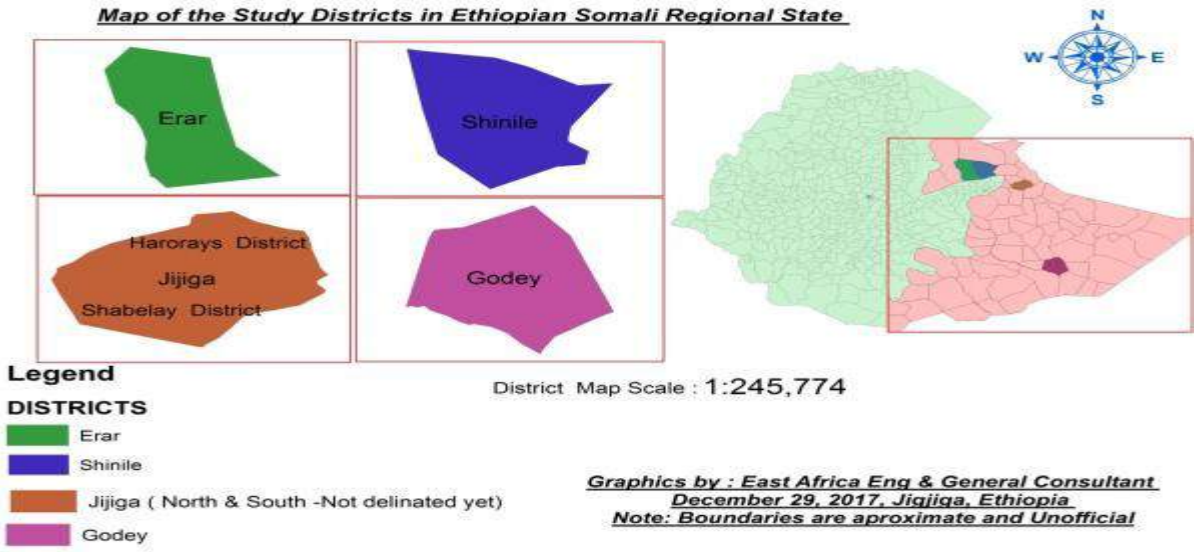
range of constraints. The key constraints resulted in low productivity of livestock affecting the livelihood of the pastorals and agro-pastorals are:-

- Over grazing
- Bush encroachment
- Drought
- Decline of seed from soil bank

2.3 Background of the Study Sites

The physical characteristics of the study areas are compiled from documentary evidences, maps, and field observations by consultant team. The study was carried out in Shabelay, Harorays, Shinile, Erer and Gode districts of Ethiopian Somali Regional state. Shabelle and Harorays districts are located in Fafan zone and Erer and Shinile districts are located in Sitti zone where Gode district is located in Shabelle zone.

Figure 2: Map of the Study Districts in Ethiopian Somali Regional State



2.3 Livelihood Profile of the Study Districts

According to the existing regional livelihood profile, Erer and Shinile districts are categorized under two major livelihood zones namely Shinile Pastoral and Shinile Agro pastoral Livelihood zones where the proportion of the population in each livelihood zone is 80% and 20% respectively for both district. In Shinile Agro pastoral, main rainy seasons are Dira'a (late March – Mid-May) and Karan (July – early Sept) and the area comprises mainly lowlands with high percolation and evaporation

(Gamoochi). In Shinile Pastoral Livelihood zone, there are two rainy seasons: Gu and Karan, and three seasonal rivers: Erer, Hurso and Chow. Several dry river beds also flow north across the entire zone and shallow wells dug in these riverbeds provide most of the water for Agro pastoralist and pastoralists community.

Moreover, Harorays and Shabelay (Jijiga North and South) districts are also categorized under Jijiga Sedentary Farming and Jijiga Agro pastoral livelihood zones where the proportion of the population in each livelihood zone is 90% and 10% respectively for each districts. These two districts depend on the Dira' rains (mid-Mar – mid-Jun) and the heavier Karan rains (mid-Jul – mid-Sep), both equally important for cultivation/maturation of crops, water availability and pasture regeneration .Gode district also constitute three major Livelihood zones namely, Gode Agro pastoral, Korahe-Gode Pastoral and Shabelle Riverine Livelihood zones. The proportion of the population living in each livelihood zones is 40%, 35% and 25% respectively. Climate is arid with two rainy seasons: Gu/Belg main rains (late March - late June); Deyr/Meher rains (mid-October - mid-December) where average annual rainfall is 300mm.

2.4 Hydrology

The source of water for the study sites of Gode district (Kunka and Badila'ad) is the Wabe Shabelle River for irrigated crops through pumping water by most farmers and methods of irrigation consists of basin irrigation, quality of the water of the river is medium, salinity rarely exceeding 750 micro mhos/cm at 25m, dominant salt in solution is gypsum (C2SO4) amount of sodium being significant.

Local rain from the North East Catchment of Wabe Shebelle River (Somali Region) areas unlike that of North West Catchment (Oromia Region) contributes high saline run off to the river during April-May and October –November. Ground water is medium in August – September and higher in October to November. Generally, Wabe Shabelle River flow is low in January – February, March and December and high during the remaining months. Probability of flooding in the form of River flooding from the Wabe Shebelle River and Flash floods from local streams is medium in September and high in October and November during Deyr/Meher rainy season and medium in April and high in May during the Gu/Belg rainy season due to the effect of rainfall in the project area and the

torrential rainfall from the North-East Catchment (Somali Region) and North-West Catchment (Bale highlands of Oromia Region) of the Wabe Shebelle Basin.

Harorays (JijigaNorth) and Shabellay (Jijiga south) districts are located at an average altitude of 1600 amsl. These two districts have two distinct agro ecological areas - valleys and mountains in the South and vast plains in the north-east and south. There are no permanent rivers running through these two districts. The Fafan River and Jerer valleys are all seasonal.

Both districts depend on the *Dira'* rains (mid-Mar – mid-Jun) and the heavier *Karan* rains (mid-Jul – mid-Sep), both equally important for cultivation/maturation of crops, water availability and pasture regeneration.. The dominant soil is black clay (fertile) soil in the vast plain. Erer and Shinile area also have an average altitude of 1000-1100amsl respectively. Main rainy seasons are D*ir'a'a* (late March – Mid- May) and K*aran* (July – early Sept). The area comprises mainly lowlands with high percolation and evaporation (G*amoochi*). Shinile district particularly the Harawe study site has huge resource of ground water that can be used for irrigation purpose where as Baraq site has surface water (spring water) resource for cultivation of particularly horticulture crops.

2.5 Cropping seasons

In order to exploit the year round agricultural potential in any intervention it is crucial to understand when water shortage is likely to occur and two distinct cropping seasons are distinguished according to the natural rain fall season to supplement at least the pre – irrigation requirement (or reduce fuel cost) particularly in Gode area.

Generally, in Gode area, the first cropping season is defined from March – May and the second is from October till November where the cropping calendars are April planting and October planting respectively. For, Harorays and Shabelay districts, the first rain is Dira'a rainfall (mid-Mar – mid-Jun) and the heavier *Karan* rains (mid-Jul – mid-Sep). For Erer and Shinile the important rainfall for crops Main rainy seasons are D*ira'a* (late March – Mid- May) and K*aran* (July – early Sept).

Section-III: Objectives and Methodology

3. Objective and Study Methodology

3.1 Objectives of the Fodder Market Assessment

The main objective of this assignment is to study the functioning of Fodder Marketing System, seasonal variability of feed and fodder, source of production and to produce ideas for up scaling of fodder related interventions in Somali Region in general and in the project area in particular.

Specific objects include,

- Within the project area Identify major fodder production pockets, growth potential, market trends & competitiveness of Fodder value chains (supply and demand) including its future prospects within the Somali region and cross border.
- Fodder Value chains mapping that depict the fodder chain actors and their functions & inter relationship.
- Identify and examine constraints and opportunities within fodder value chain and recommend interventions to overcome constraints and make use of opportunities to promote inclusive & sustainable resilience and economic growth.
- Analyze dynamics of fodder relating processing and value creation, reward distribution, value chain governance and power relation structures and knowledge transfer.
- Identify the underlying policy, institutional, and infrastructural issues that affect the competitiveness of fodder marketing and in its value chains with reference to the role of government and private sector in the project target districts.
- Also develop a matrix for fodder production and marketing indicating areas of priorities for which public sector can intervene and areas for the private sector support.
- Identify institutions and organizations working for selected value chains from local levels (local, regional, national organizations from GO, NGO and private sector) that can contribute to value chain development.

3.2 Study Methodology

The following methodologies and approach was used for gathering relevant information and data.

Research Strategy

- Quantitative (HH survey,)- 90 selected households (Purposive sampling technique)

- Qualitative (Study)- 10 community level FGDs (2 FDG) per woreda, (5 Woredas x2) =FGDs =10 FGDs

Tools for Data Collection also includes rreview of secondary source, household survey Questionnaire, key informant Interview, focus group discussions and oobservations.

3.2.1 Consultative meeting with GIZ Programme Team in Somali Region

The consultant team held a briefing meeting with the GIZ programme team to discuss and get a clearer understanding of the assignment, agree methodologies and approaches and collect relevant documents for desk review. Field work in the five study districts started on May 12, 2018 after the initial consultation with GIZ.

3.2.2 Geographical Area Covered

Data was collected from five districts of Somali Region i.e. Harorays (Jijiga north), Shabellay (Jijiga south), Shinile, Erer and Gode districts using key informants, Focus groups and household surveys.

3.2.3 Literature review

The consultant reviewed documents relevant to the assessment, existing project documents and other background information. The review was very helpful in terms of providing useful information such as national standards and refining study techniques.

3.2.4 Key informant interviews

The key informant interview was conducted with the following stakeholders in the five study districts

1. Federal Central Statistical Agency Branch office (at Jigjiga)
2. District Livestock and Pastoral Development office of the five study districts
3. District Agriculture and Natural Resource Development offices of the five districts
4. Women and children office of the five districts
5. Cooperative offices of the five districts
6. Regional Livestock and Pastoral Development Bureau
7. Regional Agriculture and Natural Resource Development Bureau
8. Regional Pastoral and Agro pastoral Research Institute
9. Somali Region Seed Enterprise

10. Save the children International offices (at Sitti, Erer, Jijiga and Gode)
11. OXFAM GB offices (at Sitti zone and Jigjiga)
12. VSF-Suisse office (at Sitti zone)
13. Food and Agriculture Organization office (at Jigjiga)
14. PWO offices at (Erer and Shinile Woredas)
15. ADRA office (at Gode)
16. Mercy Corpse office (at Gode)
17. Cooperatives of the MNB producers at Erer
18. Cooperatives of Sudan Grass Producers at Gode (representatives of 50 Youth Cooperatives)
19. Individuals /Cooperatives of Sudan Grass in Gode area
20. Private Investors who are involved on agribusiness and fodder production (ex AGMAS, Bandarkhayr Agricultural Farm etc)

3.2.5 Focus group discussions with Agro pastoralists

The consultant team has conducted in-depth discussions with important groups in all the ten study sites/kebeles and nearby towns as well. Discussion issues include fodder input availability, water availability, production, storage, logistics, marketing and constraint as per the checklist. These groups include:

1. Agro pastoralists (who are both producers and consumers as well)
2. Fodder processors and traders
3. Fodder transporters
4. Fodder Consumers (Agro pastoralists and urban and peri-urban livestock owners)

3.2.6 Detailed survey

The consultant team has conducted a detail survey using questionnaires. Based on this, the survey was conducted on the representatives of the four actors mentioned above. The sampling was purposive particularly focusing on areas where fodder is cultivated, existence of livestock resources and linkage with farmers, trading and consumption areas. Finally the consultant team has carried out a detailed survey on randomly selected representative sampled of the fodder Value Chain actors' categories as depicted in table 1 bellow.

Table -1: Description of Sampled respondents for the detailed survey

s/n	Market Chain actors of the five districts	Sample for the survey in the five districts (n)	% of total population (P)
1	Agro pastoralists /Farmers (rural)	90	5
2	Fodder Processors and sellers	8	20
3	Fodder transporters	17	14
4	Fodder traders	35	5
5	Fodder Consumers (Urban Livestock owners)	20	5
	Total	**170**	

3.2.7 Market Assessment

Market assessment has been conducted by interviewing several members of the private sector who play different roles in the market channels related to the fodder products in the study districts.

3.2.8 Key approaches used for the fodder market assessment in this study

The method used to carry out the value chain analysis was based on the following procedure:

(1) Identify feed resources in the study sites
(2) Identify representative product for analysis and ranking

(3) Develop value chain map for the selected product, depicting key activities and actors and using available information on production, trade and marketing activities,

(4) On the basis of the maps, to identify critical constraints to fodder market and fodder value chain development

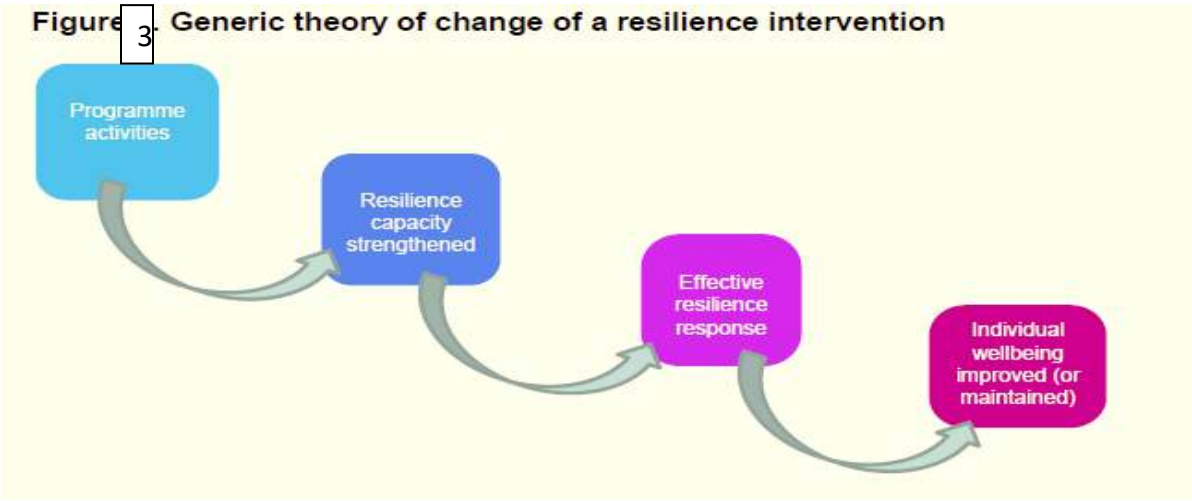
The necessary explanations about each of the above steps are given in the relevant sections.

3.3 Definitions and Conceptual Framework

Resilience: According to FAO Resilience is the ability to prevent disasters and crises as well as to anticipate, absorb, accommodate or recover and adapt from them in a timely, efficient and sustainable manner. This includes protecting, restoring and improving agriculture livelihood systems under threats that impact agriculture, food and nutrition security and food safety (and related public

health)[1]. Moreover, according to DFID's working definition, **Disaster Resilience** is the ability of countries, communities and households to manage change, by maintaining or transforming living standards in the face of shocks or stresses - such as earthquakes, drought or violent conflict - without compromising their long-term prospects.

Figure 3 : Generic Theory of Change



Food Security: Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life". (World Food Summit, 1996)[2]

This widely accepted World Food Summit (1996) definition reinforces the multidimensional nature of food security and includes food access, availability, food use and stability. It has enabled policy responses focused on the promotion and recovery of livelihood options. Livelihood approaches are now fundamental to international organizations' development programmes. They are increasingly applied in emergency contexts and include the concepts of vulnerability, risk coping and risk management. In short, as the link between food security, starvation and crop failure becomes a thing

[1] Sustainable agriculture, nutrition, food security and food safety (and related public health) is summarized as: agriculture, food and nutrition

[2] World Food Summit 1996, *Rome Declaration on World Food Security.*

of the past, the analysis of food insecurity as a social and political construct has emerged (Devereux 2000)[3].

Livelihood Zone (LZ) Definition: Central to the Household Economy Approach is the concept of Livelihood Zones (LZ). Different populations live by very different means depending on their ecological environment, their assets, culture, skills etc. Some may depend primarily on livestock or fishing, others on agricultural production. Because of rainfall, soil type or marketing possibilities, some areas will be suitable for cash crops (such as cotton or tobacco) and others will produce only cereal staples. As a result of these different circumstances different population groups will adopt different approaches for survival. A group or population that obtains its food and income sources form a broadly similar combination of means and that have similar response to shocks is known as a Livelihood Zone

Promising agricultural supply chains: Agricultural and Livestock supply chains are also economic systems which distribute benefits and which apportion risks among participants. Thus, supply chains enforce internal mechanisms and develop chain wide incentives for assuring the timely performance of production and delivery commitments (Iyer& Bergen, 1997, Lambert and Cooper, 2000)[4]. They are linked and interconnected by virtue of shared information and reciprocal scheduling, product quality assurances and transaction volume commitments. Process linkages add value to agricultural products and require individual participants to co-ordinate their activities as a continuous improvement process. Costs incurred in one link in the chain are determined in significant measure by actions taken or not taken at other links in the chain. Extensive pre-planning and co-ordination are required up and down the entire chain to affect key control processes such as forecasting, purchase scheduling, manufacturing programming, sales promotion, and new market and product launches.

The value chain: The term value chain was first popularized in 1985 by Michael Porter**,** who used it to illustrate how companies could achieve what he called "competitive advantage" by adding value

[3]**Devereux, S. and Maxwell, S. (eds)** (2001). *Food security in sub-Saharan Africa,* London: ITDG

[4]Iyer, A.V. & M.E. Bergen, 1997, "Quick Response in Manufacturer-Retailer Channles", Management Science, ol.43, No. 4, pp. 559-570

Lambert D.M., Cooper M.C., 1998, "Issues in Supply Chain Management''. Industrial Marketing Management. 29, 65-83.

within their organization. Subsequently the term was adopted for agricultural development purposes and has now become very much in vogue among those working in this field, with an increasing number of bilateral and multilateral aid organizations using it to guide their development interventions.

At the heart of the agricultural value chain concept is the idea of actors connected along a chain producing and delivering goods to consumers through a sequence of activities. However, this "vertical" chain cannot function in isolation and an important aspect of the value chain approach is that it also considers "horizontal" impacts on the chain, such as input and finance provision, extension support and the general enabling environment. The approach has been found useful, particularly by donors, in that it has resulted in a consideration of all those factors impacting on the ability of farmers to access markets profitably, leading to a broader range of chain interventions. It is used both for upgrading existing chains and for donors to identify market opportunities for small farmers. (Source: Wikipedia)

Disaster Risk Reduction (DRR): refers to the conceptual framework of elements considered with the possibilities to minimize vulnerabilities and disaster risks throughout a society, to avoid (prevention) or to limit (mitigation and preparedness) the adverse impacts of hazards, within the broad context of sustainable development. However, disaster Risk Management (DRM) includes but goes beyond DRR by adding a management perspective that combines prevention, mitigation and preparedness with response[5].

Value chain operators, supporters and enablers

Value chain operators are entrepreneurs/ enterprises performing basic functions on a value chain. They create value and own the product at some stage. For instance in the sesame sector, key Value Chain operators are **farmers, cooperatives and unions, investors and their associations, ECX (Ethiopian Commodity Exchange) licensed traders, processors, exporters and importing traders and companies**. As they provide for markets and pursue benefits they drive value chain development and innovation.

[5] Sustainable development is defined as "Development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Refer to the UN Department of Economic and Social Affairs, Division for Sustainable Development: available at www.un.org/esa/sustdev).

Value chain supporters are part of the private sector and provide support services to chain operators; they provide business to business (B2B) services. Actors of this group include: **laborers, agro-input dealers (seeds, fertilizers, chemical products), financial services (commercial banks, MFIs, cooperative banks, informal money lenders), brokers, storage providers, cleaners, machinery companies, transporters, agribusiness advisors and private sector associations**. Even though value chain supporters do not own the product (e.g. sesame or sorghum), they have a stake in the value chain. When sesame value chains flourish they can sell their products and services. [6]

Value chain enablers define, facilitate and control the policy and business environment, they create conditions for the private sector to do business. They are part of the public sector and include: Government structures at different levels and different public agencies and services: Federal and regional Governments and ministries, Agricultural Transformation Agency, local government and local administrative offices, Bureau of Agriculture and its extension agents, Cooperative Promotion Agencies and training centers, the Ethiopian Commodity Exchange (ECX), Universities, Ethiopian Institute of Agricultural Research (EIAR), Regional Pastoral and Agro pastoral Research Institute, law enforcers (police, courts, border control), inspection services and Bureau of Standards, Tax and Revenue Authority (TRA)

Section-IV: Data Analysis

4 Data analysis and description

4.1 Fodder resources, production and practices in the study areas

The agro-pastoralists living in the study districts cultivate various food crops, some of which residues are used after harvest as livestock fodder while selling the rest to other farmers is common phenomena depending on the scenarios of drought. Exceptional to this is a common practice that exist in Gode area and all areas along major Rivers such as Wabe Shabelle, Weyb, Genale and Dawa Rivers, where maize and sorghum plants at 45-50 days (or after second irrigation) or before maturity is harvested and marketed. Some of the major naturally grown plants, cultivated crops and products consumed for livestock and also traded (sold or purchased) as fodder crops by the

[6] Sesame Business Network support programme, Annual report 2013 and orientations for 2014

agro-pastoralists in the study areas are shown in Table -2 below. Generally, the livestock feed resource identified in the study area is categorized in to four parts (1) Natural Roughage (which is further divided in to natural pasture as cultivated food and fodder crops), (2) Agro Industrial by products, (3) Processed feed or compound feed and (4) Left over.

Table 2: Types, sources, uses and geographical distribution of livestock feed resources across the study area

s/n	Types of fodder crops grown or cultivated	Sources and use of fodder	Geographical areas
A	**Natural Roughage**	**Natural roughages are two types : naturally grown fodder and cultivated fodder crops**	
1.	Natural Pasture (for grazing or browsing)	This includes pasture, grasses , weeds, trees and shrubs that is natural grown in the range, shrub, and forest lands which is consumed by livestock as a regular their fodder.	Found in all the five study districts with in different types and magnitude
2.	Maize (Zea Mays)	Maize Stover is the most common fodder and is delivered or sold in bundles. The maize was originally grown for human food but now there is shift of use as green fresh fodder; in one FGD it was said that up to 80% of the maize is now primarily grown for fodder. This use also includes the Stover residues after thinning and after harvesting the cobs.	This is widely practiced in all areas communities along his major rivers of the region. Whereas its use a s residue is also common in remaining four study districts.
3.	Sorghum (Sorghum bicollour)	Sorghum Stover is delivered or sold in tied bundles; it is the common local variety but grown mostly under rainfall runoff moisture due to its tolerance to moisture stress and mostly used or sold as fodder. It is also used as crop residue for fodder after harvest	This practiced in Gode area where the mean annual rainfall is 300 mm however, in the remaining study areas it is used as residue after harvest
4.	Wheat	This is mainly produced for food consumption and selling of the surplus grains where as the residue is wasted on the farm	Limited to Harorays and part of Shabellay districts
5.	Weed bundles/collected grasses and legumes	These are small bundles of mixed plants types consisting of natural grass types and herbs, cereal (from thinning) and is found in all study sites practiced They are harvested by farm laborers as sole or part of payment for clearing the farm lands. These bundles are also used by laborers as fodder for their livestock and/or sold.	This commonly sold in all markets such as Gode, Shinile and Jijiga and Erer towns , it is mostly given to donkeys that pull carts the whole day , lactating animals and small ruminants and sick animals
6.	Cowpea (*Vignaunguiculata)*	This is common Erer and Gode area where irrigation is widely practiced and the leaves are provided to	Mostly practiced in Gode and Erer study areas

		livestock	
7.	Sweet Potatoes (*Ipomoea batatas)*	Sweet potatoes are grown for food and the vines used as fodder. There were no sales involved; what was available was only for home livestock consumption.	Mostly practiced in Erer district
8.	Sudan Grass (*Sorghum valgarevar, Sudanese)*	These are recent introductions by Research Centers to improve on the production of fodder from appropriate plant varieties. It is the only improved forage grass adopted by the local communities out of dozens of improved forage crops trailed on farmers plots by research centers.	Mostly practiced in areas that has access to irrigation water such as Gode, Shinile and Erer districts
9.	Napier Grass (*Pennisetumpurpureum)*	At the time of the survey Napier grass was found grown only in Erer district a few farms and no sales were observed in the markets popular fodder by all the actors.	It is popular in all areas but the adoption is very low so far.
10	Alfalfa	Tried by the research center on farmers plots	Very low or none adoption by the farmers
11	Lablab	Tried by the research center on farmers plots	Very low or none adoption by the farmers
12	Buffle grass	Tried by the research center on farmers plots	Very low or none adoption by the farmers
B	**Agro industrial by Product (AIBP)**	**Secondary products obtained after the major output is produced**	**In factories and mills**
1.	Sesame oil seed Cake	This is mainly the byproduct obtained after sesame is processed for the main purpose of producing edible oil where the sesame oil seed cake is its by product which is used as a livestock feed. The byproduct is locally known as '' Maankaal'' and used as livestock supplementary feed.	The processing mills are found in Gode town
2.	Wheat Bran	This is the byproduct of wheat flour production from factories and although the main purpose is flour production two types of wheat bran is the by product for supplementary livestock feed-the fine grain and the coarse	In Jijiga town approximately seven factories are found and other four are located at Dire Dawa
C	**Processed Feed (compound feed)**	**This are feeds formulated in special manner**	Found in Jijiga , Erer and Gode
1.	Activated Total Mixed Ration (ATMR)	This is a formulated feed that has several ingredients which is specially formulated for livestock supplementary feed purpose only and it includes Activated Total Mixed Ration (ATMR)	A privately owned enterprise exists in Jijiga town
2.	Multi-nutrient Blocks (MNB)	These has also several ingredients as a raw material and is used as livestock supplementary feed purpose only	A cooperative owned processing plant exists in Erer and Gode towns (so far the Erer one has started functioning)
D	**Leftovers of edible plants**	**Are remnants of different plants used as food by human**	**Found in all areas with different in types and magnitude**

1.	Sugar cane (Saccharum-officinarum)	This practices also exist in some areas of the study areas such as Erer and Gode where irrigated Sure Cane is intermittently planted by small holder farmers for commercial purpose and after the harvest	Sometimes practiced in Erer and Gode areas
2.	Khat	It is widely practiced in all the study sites except one site. It is used as cash crops but the leftover of the Khat locally known as '' Garaabo'' is consumed by small ruminants	Except Gode , it grows in all the remaining study sites and it is important source of feed for sheep and goat in urban areas.
3.	Water Melon	It is grown mostly in all study sites for cash crop purpose and planting is adjusted to the Fasting month of Ramadan in most cases	The left over is an important source of feed for donkeys and dairy cows in urban areas such as Gode.
4.	Banana (*Musa spp.)*	Banana is mostly cultivated in Gode and Erer study site as a cash crop	Mostly practiced in Gode where the leftover of the fruit is mostly consumed by donkeys and small ruminants where the leaves are also given to animals at the farm gate.
5.	Onion leaves (at harvest or farm gate)	Is cultivated in all study sites in varies degree	The bulk of onion is cultivated along major Rivers

In spite of the existence of the above long list of fodder resources produced, sold or purchased and consumed as fodder by the agro pastoralists across the study sites, this study puts emphasis on the major fodder types used in the study sites. Theses fodder types include residues of sorghum & maize, green fodder of sorghum & maize, sesame oil seed cake, wheat bran and wheat middling, Activated Total Mixed Rations (ATMR), Multi-nutrient Block (MNB) and Sudan Grass which are produced and marketed in the study areas.

Moreover, categories of fodder types that are consumed by livestock in the study area without passing through any market channel also include; natural pasture and browse, grasses from bushes and fenced areas or airfields/ air ports, biomasses of grasses and legumes collected during weeding and immediately after crop harvest. However, Jijiga, Gode and Dire Dawa air ports' or fenced areas are important sources of natural grass during drought time for agro pastoralists living in Harorays (Jijiga-north), Shabellay (Jijiga south), Gode and Shinille districts. According to the focus group discussions, the air port officials are very collaborative during drought time and allow people to cut natural grasses grown in the air port premises free of charge to enable pastoralists save their livestock from the drought. Moreover, the air port officials also sell part of the grasses to agro

pastoralists coming from far areas of the Fafan, Sitti and Shabelle zone. Kabridahar air port which was constructed in 2014 is also believed to provide similar feed production and donation to livestock owners or sale fodder in the future. Although, other fodder types such as cowpea are common in most of the study sites, mostly through intercropping, the magnitude and frequency of production is very low compared to cereal crops. Except Sudan grass, all the remaining improved forage varieties described in the above table have been introduced by the local research centers where as the adoption by the local people is very low due to factors related to seed availability and management of the forage crop and tolerance to drought etc.

Generally, residue from wheat crop is also available at Harorays and parts of Shabelay Woredas where as the major problem is lack of awareness and difficulty of managing the residue during harvesting time. Obviously, all farmers use in those districts use combine harvesters on rental bases whereas the wheat residue is crushed and dispersed by the wind inside the farm. Besides, the focus of the farmer and the combine harvest operators are on the wheat grains rather than managing both the grain and the wheat residue and a huge amount of wheat residue is wasted every year. Khat which is a stimulant crop is also another crop mainly produced and marketed as a cash crop in some areas of the study sites such as Erer, Harorays, Shabelay and parts of Shinile districts. The left over is known as '' Garaaba '' and is consumed by goat and sheep in most villages and towns and even in big cities except in Gode where the Khat itself is supplied in small quantity compared to other districts.

Although it is a common practice to collect the left over by some households through their children to feed goat and sheep particularly to the delivered, sick and young goat or sheep in most towns, there is a huge loss of this left over every year due to lack of awareness to preserve and manage as a fodder. Most of the bulk of Khat plant is from Oromia region and some are produced locally as well in the above four districts in a various quantity.

4.2 Key Actors of the Fodder Value Chain in the Study districts

The Interview with Key Informants and Focus group discussions showed the market chain actors where the some types of fodder are grown in all the study areas by the farmers. Portion of the fodder is used for their own livestock and the surpluses also sold to other livestock users, either directly or through transporters and traders in and around the study areas. In the study districts the major types

of fodder observed are crop residue (maize and Sorghum), Sudan grass, Sesame oil seed cake, wheat bran, ATMR and MNB. However, existence of the above fodder resources differs across the study Woredas. While production and marketing of the sorghum and maize residues as a fodder and also green maize and sorghum as a fodder are common practices in all the study sites, production and marketing of sesame oil seed cake is limited to Gode district due to wide practice of sesame crop cultivation along the Wabe Shabelle River. Moreover, production of ATMR and MNBs are limited to one private enterprise in Jijiga town named as Sufi livestock feed enterprise where one cooperative in Erer town is also specialized in the production of MNBs. But due to limited linkage to market coupled with lack of some of the raw materials, both the enterprise and the cooperative operate much below their capacity.

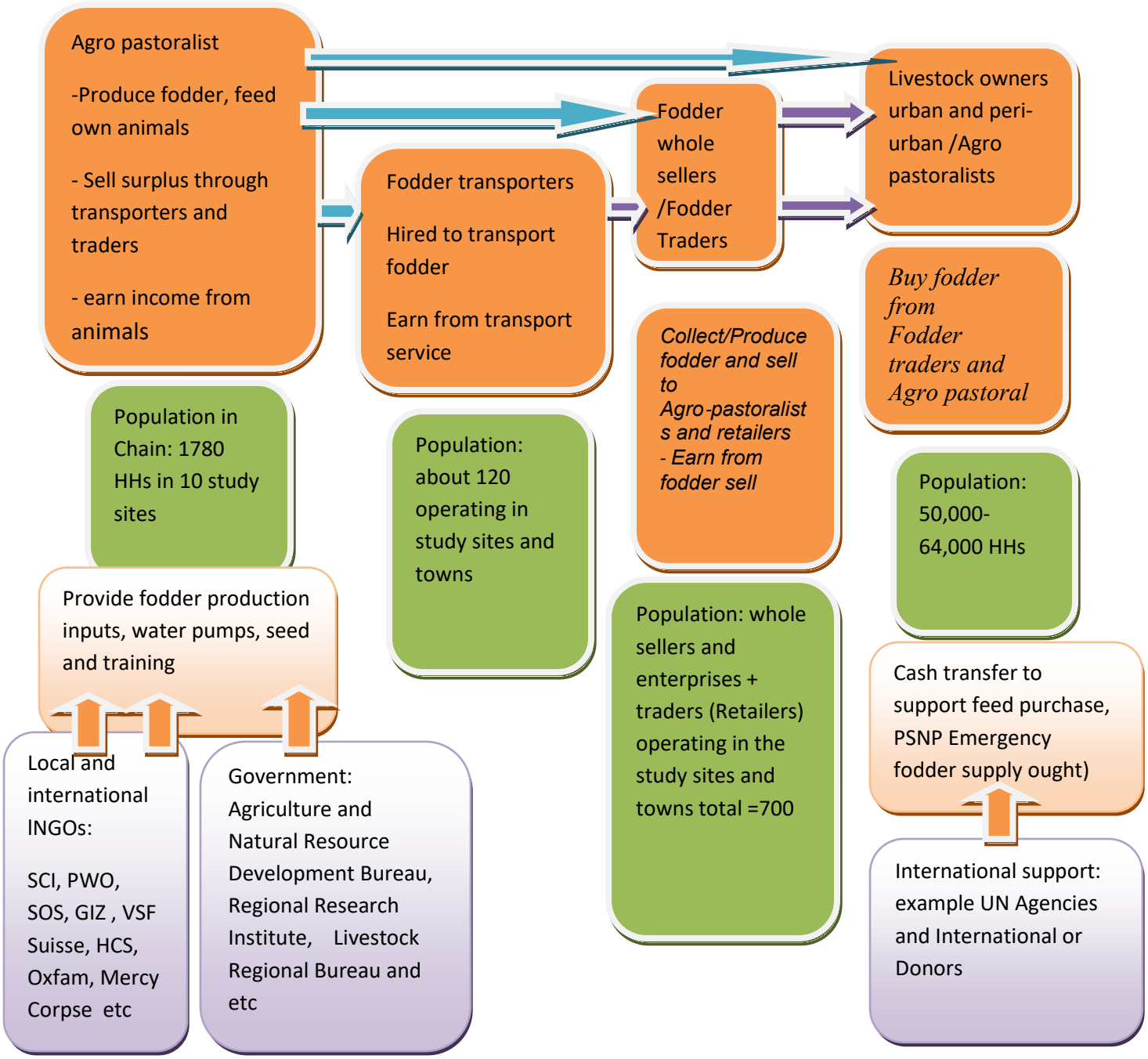
Moreover, the production and marketing of wheat bran also exist in Jijiga and Dire Dawa towns only where the producers the wheat flour factories. Wheat bran traders and the agro pastoralists in Erer, Shinile, Harorays and Shabelay districts are the customers to the wheat flour factories. The customers of the wheat traders are urban and rural people who leave particularly in Jijiga, Dire Dawa and the above four districts there are only 5 wheat traders in Erer town but the majority of the wheat bran traders are concentrated in Jijiga town. Moreover, in Harorays, Shabelay and Shinille, the consumers (agro-pastoralists) directly purchase the wheat bran from the factories although there are few traders Shinile town as well. The survey also reveals existence of other traders who supply bean/cowpea as a livestock fodder and these are also limited to Shinile and Erer study sites only. In Gode district, there is no any wheat flour factory but the agro pastoralist buy maize concentrate and sesame oil seed cake from the local processing mills and from some traders in the town as well. However, the production and marketing of green maize and sorghum fodder is more intensive in Gode town than other study sites where the producers are the farmers and the buyers are the urban or peri-urban (Gode town) livestock owners. During drought times, the remote pastoralists also buy the green fodder from the agro pastoralist along the Wabe Shebelle River for their livestock.

Table 3: Estimation of population of the fodder market chain actors in rural areas of the study area and nearby towns

s/n	Location	Estimated total populations				
	District/towns	Estimated Agro pastoralists (HHs) at the study sites and nearby towns	Private enterprises, factories , mills processing fodder and selling fodder	Fodder transporters	Fodder traders	Estimated total population of the rural target districts (HHs)
1.	Harorays rural	360	1	10	150	9,500
2.	Shabelay rural	340	1	10	120	10,500
3.	Shinile rural	350	1	10	75	16,500
4.	Erer rural	360	1	15	120	9600
5.	Gode rural	370	0	10	160	18,500
6.	Jijiga town	0	20	20	30	N/A
7.	Dire Dawa town	0	4	5	3	N/A
8.	Shinile town	0	2	5	2	N/A
9.	Erer town	0	3	5	10	N/A
10.	Gode town	0	8	30	30	N/A
	Total	1780	41	120	700	64,600

Source: survey result from FGDs and KIIs (2018)

Figure 4: The fodder value chain mapping and chain actors in the study areas



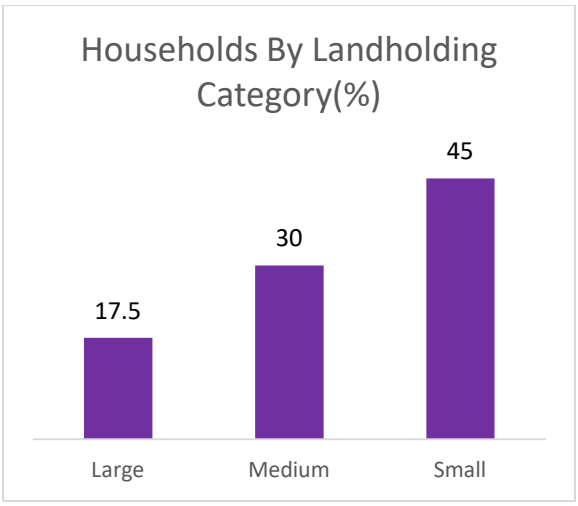
4.3 Cross-sectional view of the Fodder market chain actors

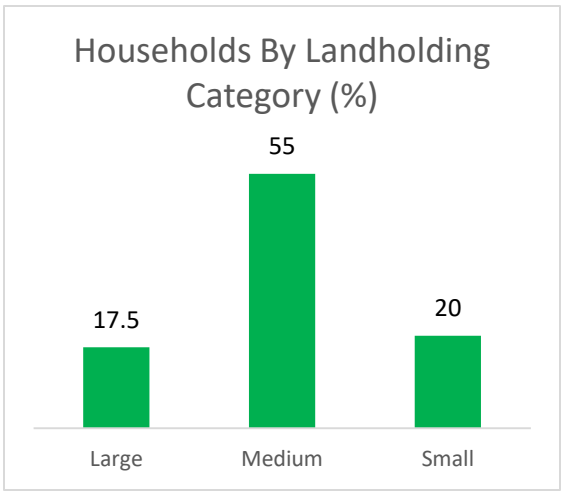
4.3.1 Fodder producers – the agro-pastoralists

Availability and condition of water and land are the major limiting natural resources for fodder development planning other issues being constant. Agro-pastoralists in the study areas of Harorays, Shabelay, Shinile, Erer and Gode districts own land within their Kebeles. Except Harorays and Shabelay districts of Fafan zone which are mostly dependent on natural precipitation for crop production, the remaining study area of Shinile, Erer and Gode districts are low land areas and heavily dependent on irrigation water sources to supplement the crop water requirement over the growing period of crops. Shinile study sites use both bore holes in the plain areas and spring water from the nearby mountains. In Erer study sites as well, crop production is heavily dependent on the seasonal surface water from the nearby mountains.

However, the Agro-pastoralist in Gode study sites depend on irrigation water from the Wabe Shabelle River where water is pumped from the River to the field with the help of diesel water pumps. Generally most of the agro-pastoralists household heads in this study (70%) are male; substantiating group discussions' suggested that farm land traditionally belongs to men; whereas, if the husband is deceased, the widow will have a full control over the land on behalf of her children. Most agro-pastoralists (80%) were over 30 years, with 40% over 40 years.

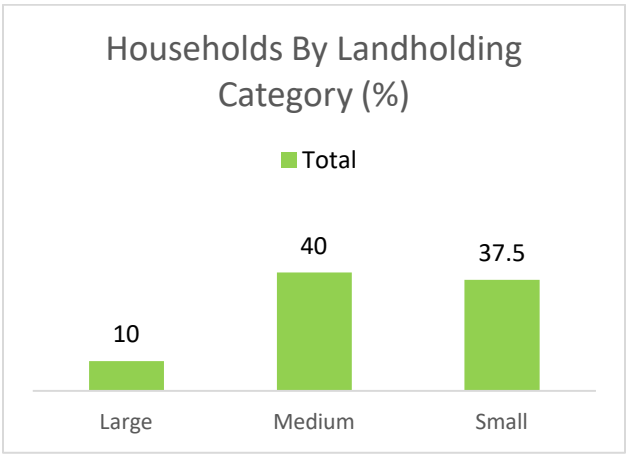
There is no problem of land accusation in the study area as land is inherited through clan and family ties. However, Harorays and Shabele districts which are entirely depend on rain fed for crop cultivation are experiencing high rate of agricultural land expansion which puts the limited grazing alnd at risk in the future. The land holding which is the land under cultivation was assessed in the remaining three study districts where figures below depict variation among the five assessed districts due to agro ecological, hydrological and economic factors.





Figure(a) - Harorays district ***Shabelay district (b)***

Three categories land holdings has been identified as Large, Medium and small for each study district where for Harorays district ranges as Small Farm: 0 to 1 ha Medium Farm: 1 to 4 ha Large Farm: 4 ha and above. Based on this for Shabelay district, the land holding becomes Small Farm: 0 to 1 ha, Medium Farm: 1 to 3 ha, Large Farm: 3 ha and above.



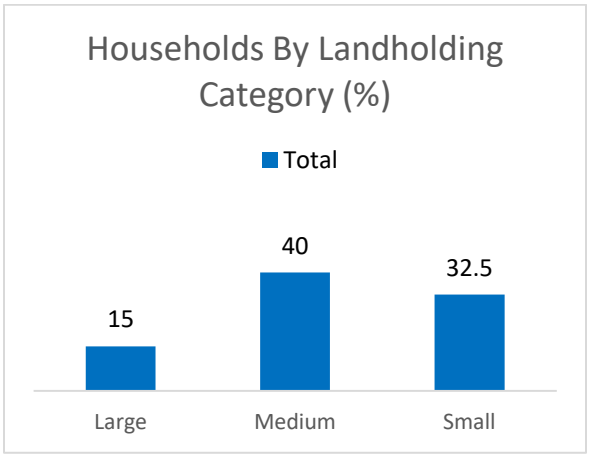


Figure (c) - Shinile District ***Erer District (d)***

The land category for Shinile and Erer Woredas also ranges as Small Farm: 0 to 1 ha Medium Farm: 1 to 2.5 ha Large Farm: 2.5 ha and above, for Shinile and Small Farm: 0 to 1 ha Medium Farm: 1 to 1.75 ha Large Farm: 1.75 ha and above for Erer district.

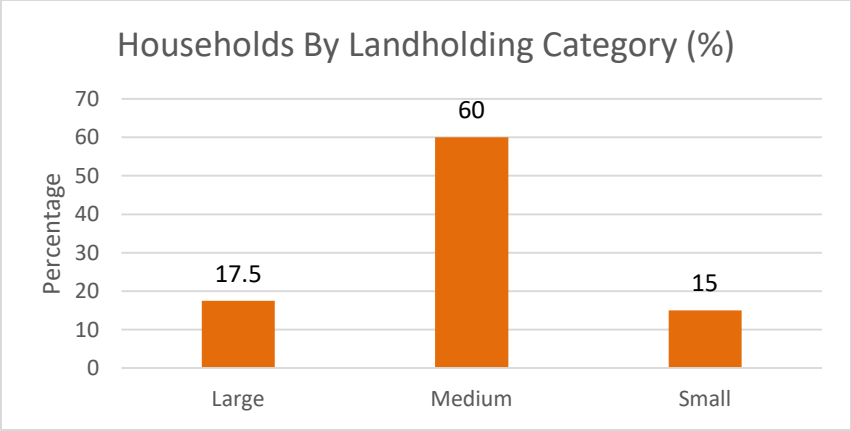


Figure (e) - Gode district

The land category in Gode also ranges as Small Farm: 0 to 1 ha Medium Farm: 1 to 2 ha Large Farm: 2 ha and above. In Gode site the study showed that although most of the fodder is grown by land owners but sometimes the fodder particularly green maize and sorghum locally known as '' Bal'' is grown by laborers or relatives who have been allowed access to the irrigation plot by the owners in a share-cropping arrangement. In essence the share croppers, who – after the original landowners take their share – sell the rest to livestock keepers or traders. Some of land owners even lease the idle plots or land left fallow to other for cultivation of green fodder or other cash crops like onion.

The agro-pastoralists' profile in Table-4 below shows, most agro-pastoralists (87%) have not gone through the formal education system (primary and secondary schooling) but have received religious education. Those exposed to primary, secondary and post-secondary education are only about 13%. The agro-pastoralists household size is relatively large at 10 members per household, with 60% male and 40% Female.

Fodder transporters, particularly in Gode study sites; the fodder is transported from the farms to Gode town by donkey carts, usually commissioned by the fodder producers for the deliveries to the market. Independent donkey cart transporters in Gode collect money for fodder sales from the traders and deduct their fees before handing over the day's collection to the agro-pastoralist farmer. In the remaining four study sites, this is not the case as marketing of green fodder is not a common practice. In some cases like in Harorays and Shabelle districts sell of green fodder to the nearby agro pastoralists occur at the farm gate without cutting the fodder whereas the buyers themselves cut and transport by truck to their localities. During the drought time, fodder (crop residue) market extends

up to Wajale (the neighboring Somali Land). Regarding to the residue of sorghum and to some extent of maize, producers mostly use as livestock consumption but the surplus is sold to the nearby consumers or livestock owns and this is true across all the five study districts although the green fodder market dominates the Gode site compared to other districts.

Table 4 : Cross sectional profile of the population of fodder market chain actors

Profile		**Estimated total populations**				
Parameters		Agro pastoralists (HHs) at study sites	Private enterprises producing and selling fodder	Fodder transporters	Fodder traders	Livestock /per-urban or agro pastoralists
Number in sample (n)		90	8	17	35	20
Gender (%)	Male= (%) Female (%)	70 30	80 20	80 20	85 15	23 77
Age distribution (%)	<20 years 20-30 years 30-40years 40-50years >50 years	10 10 40 30 10	0 18 50 22 10	15 55 20 10 0	5 45 30 15 5-	4 18 40 26 12
Education level maximum achieved (%)	Illiterate	22	20	30	5	7
	Illiterate + Religious	20	27	40	30	23
	Adult education only	15	13	25	15	30
	Adult educ + Religious	30	35	25	30	30
	Primary + Religious	10	5	10	15	10
	Secondary + Religious	3	0	0	5	0
Household size (number)	Total	10	6	7	8	7
	Male	6	2	4	3	4
	Female	4	4	3	5	3
Agriculture related organizations (Agri & milk Cooperatives (%)	Total	18	3	14	3	8
	Male Female	12 6	2 1	12 2	2 1	5 3

Source: survey result from FGDs and KIIs (2018)

4.3.2 Fodder Traders

In Harorays, Shabelay, Erer and Shinile, the history of utilizing portion of the crop residue and marketing the surplus to the local community is a deep rooted tradition. However, in Gode area, marketing of green fodder of maize/sorghum has been active for the last three decades. Green Maize/sorghum fodder is the most dominant one followed by residue of maize/sorghum. Besides, green maize is mostly cultivated under irrigation along Wabe Shebele River and the marketing of green sorghum which is mostly cultivated under spate irrigation (or rainfall run off) increases when there are many farm lands that have been cultivated through rainfall run off due to the drought tolerance behavior of sorghum. In contrast, sorghum residue is the most dominant fodder in all the remaining study sites followed by maize residue. Generally, the marketing of sorghum and maize residue and marketing of green maize and sorghum has intensively increased during 2014/15 and 2016/17 due to the impact of El Nino and La Nina episodes in the Horn of Africa respectively.

Moreover, many reports shows, substantial increase in the number of traders in all towns along the major Rivers of Wabe Shabelle ,Weyb, Genale and Dawa where the agro pastoralists have adopted this issue as the main coping strategy both in saving their livestock and selling the surplus fodder to the local community in order to increase household income mostly through increasing milk yield from cattle and goat. The current irrigation centered development settlement programs has also increased the production and marketing of the green fodder in Gode area. Most of the fodder traders in Gode town are women. The women sell green fresh fodder bundles, which they originally bought from the agro-pastoralists farmers directly or through the transporters and sell to livestock keepers of Gode town.

4.3.3 Fodder Transporters

In Harorays, Shabelay, Shinile and Erer districts, sorghum and maize residue as a fodder is transported by camels from the farm gate of the sellers to the buyers' destination. When the drought situation increases, the better of livestock owner rent an ISSUZU truck to transport the purchased residue. For areas like Gode, where the green maize fodder is transported by donkey carts, the numbers of transporters are increasing since recent years. Most of the transporters are young people due to their ability to handle the donkeys and the carts better than older people.

The carts are manufactures at Gode town with 12,000-15,000 Ethiopian Birr depend on size and quality of the cart where the donkey is purchased from Gode market with 2000-3000 Ethiopian birr depending on age and physical condition. In Gode town, transporters are mostly males (75%) aged between 20 and 40 years. About 90% of the transporters had no primary or secondary education.

The average household size is 6-7 members with 4 males and 3 females. However, almost all focus groups conducted in Harorays, Shabelay, Shinile and Erer indicates that the buyer bring their camels to the farm gate and purchase the residue of sorghum and maize where either the owner of the livestock handles the camel or tasks is handled by one of the family member particularly male. There are no traders in this transaction and just the selling and buying events takes place between the producer and the consumer. Therefore, buyers of the residue plays the dual role of transporting and buying simultaneously as there is no any conventional market channel.

4.3.4 Fodder Consumers

The fodder consumers are the agro-pastoralists who use the fodder they grow to feed their own livestock and sell the rest to the local community in the case of Horarays, Shabelay, Shinile and Erer. Moreover, pastoralists living far away from the Shabelle River bank also buys the green fodder from the farmers along the River depending on the scale of feed scarcity.

The other fodder consumer groups are livestock traders who buy fodder from the agro pastoralists to feed their animals in the detention centers such as Gode, Dagahbur, Wajale towns. This is generally seasonal consumers which depend on livestock export activities and the consumption increases when there is a booming livestock market particularly during Arafa Festivals.

But the pre-urban fodder consumers in Gode town purchase significant fodder from the fodder traders every day and particularly, the transaction is huge between February- Mid April and between July –Mid October where it might continue beyond April and October if the two rainy season delay. In the peri-urban settings, the household heads are mostly women (78%) and this might be due to the act that women were in charge of the households since most of the men had moved to other business like labor or have some other tasks to accomplish outside the house. In Peri-urban settings of Gode the major livestock species kept are cattle, camel, goat and sheep. The animals are brought Gode

town to provide supplementary feed such as green maize fodder, by product of sesame or sesame oil seed cake and concentrate of maize grain or sorghum and lactating animals are brought from the pastoralist areas to the town in order to increase the milk yield and generate income from the milk sell. This is also true for camel as well where camel's milk is sold in Gode market with a good price. Average minimum and maximum price of camel milk 35-50 Birr/Litter for wet and dry season respectively. When the animal gets dry they are moved to the pastoral areas and is kept there until they deliver again or exchanged with new lactating animals. The urban women livestock keepers were between 20 and 50 years old (84%) with little only 10% had formal primary school level education.

This contrast with the agro-pastoralists household heads who were mainly males (70%). The households were larger at 7-8 members, with 70% male and 30% female. The per-urban livestock keepers had permanent laborers mainly herd attendants taking animals out to graze during the day.

The cattle and shoat (goat and sheep) and camels are moved to the grazing area every morning and drove back to the town before sun set. This task is mostly carried out by the family members whereas in the case of lactating cattle, the households in the urban areas hire a herd attendant locally known as 'Qawsaar'' whose role is to drive the cattle from every house and drive to the range land every day. However, the herd attendant does not need to drive the cattle to their home every day but he just brings up to the outskirt of the town and every cattle knows its home, this is because each cattle is accustomed with or conditioned to the supplementary fodder it is given either in the form of green maize/sorghum or concentrate upon arrival to the owners house every evening.

Section-V: Findings of the Fodder Market Assessment

5. Fodder crop production and marketing in the study districts

The study shows that the five study districts have a huge potential for fodder production. A significant portion of the fodder produced by agro pastoralist is used as subsistence fodder such as maize and sorghum residue and maize and sorghum green fodder. Production of maize and sorghum as a green fodder both as subsistence and commercial purpose is widely practiced in Gode district where the fodder is supplied to urban and peri-urban .livestock keepers. Agro pastoralist in

Harorays, Shabelley, Shinile and Erer districts also widely practice the marketing of surplus sorghum and maize residue to other agro pastoralists and pastoralists in the area.

Availability of water and land are the major determinant factors for fodder cultivation other things being constant. Moreover, increased production of sesame crop by agro pastoralists in Gode area also increases production of the sesame oil seed cake by the local sesame oil seed processing mills as agro industrial by-product (AIBP). There is no much challenge in terms of land availability in the study area whereas availability of water varies across the five study districts. The natural precipitation is the major source of water for fodder crops in Harorays and Shabelay districts.

Moreover, there is awareness among agro pastoralist community about the improved forage crops such as Sudan grass, Buffed grass, Panic, Alfalfa, Rhodes grass and Elephant grass. These improved forage crops have been tested by the Regional Pastoral and Agro pastoral Research Institute (Corpora) in the past both at the research centers and on farmers' plots. After the Institute has ensured the adaptability of the above mentioned improved forage crops, the Institute has officially released the improved forage crops and encouraged the Agro pastoralist community to adopt the forage crops. However, the study shows that only Sudan grass is the most widely adopted and cultivated both as subsistence as well as commercial fodder production purpose. The production of Sudan Grass for commercial purpose particularly in Gode and Shinile areas has increased since the recent El Nino and La Nina induced drought during 2014/15 and 2016/17 in Sitti and Fafan zones and the remaining zones of the region respectively. The wheat flour factories in Jigjiga and Dire Dawa also depend on wheat as raw materials to produce the wheat flour and the wheat bran as Agro Industrial by-product which is an important fodder for livestock. In Somali region wheat is only produced in Jijiga Sedentary Livelihood zone areas such as Tuliguleed, Awbare, Harorays and Shabelay districts of Fafan zone. The source of wheat for the above mentioned wheat flour factories are the aforementioned districts. However, due to the increasing demand for wheat flour or bread wheat for human consumption and wheat bran as a fodder in the region, the raw material i.e. wheat currently produced in the region is inadequate. Because of this reason, the wheat flour factories purchase and supplement additional wheat from locally distributed relief wheat and from other areas such as Bali areas of Oromia Regional State. The government regulation on relief wheat marketing caused challenges to the wheat flour factories in recent years.

The government regulations include strict restriction of relief wheat movement from one district to other district; other policy changes also include replacement of relief wheat with relief cash, and relief sorghum. There are other fodder producing enterprises which include Activated Total Mixed Ration(ATMR) and Multi Nutrient Block (MNB) enterprise (Sufi) in Jijiga town and multi Nutrient Block producer cooperative (Himilo) in Erer town. Two types of fodder which are very essential fodder types in the other parts of Ethiopia are not practiced in the region in general and in the study districts in particular. These are production of hay of natural pasture and use of wheat straw in the wheat producing districts. In few areas, the agro pastoralists harvest limited amount of natural pasture just in the vicinity of their farm plots and use as fodder for their livestock. Regarding to the wheat straw, the agro pastoralist are aware of the importance of wheat residue as fodder whereas there are two reasons suggested by the FGDs for not using it. Firstly, the wheat is harvested by combine harvester in all the wheat producing areas and secondly, the deal between the farmer and the combine harvest owner (operator) is based on harvesting the wheat grain and hence no attention is given for the residue. Because of this reason, the straw crushed by the machine is dispersed by the wind in the farm and a huge quantity of wheat residue is lost every year. For instance, according to a Multiagency Rapid Assessment Conducted in 2016, an estimated total crop land of 57,942 Ha was planted in Harorays and Shabelay districts and the three major cereal crops cultivated were maize, sorghum and wheat. Assuming that about 1/3 of the land (19,314 ha) was covered with wheat, it can be concluded that about 5-10 tone/ha or 96,570 – 193,140 tons of wheat straw is lost every year in the two districts on average.

Generally, the current fodder production practices are two types (1) Subsistence fodder production which consist of maize/sorghum residue and green fodder as well where the Agro pastoralist produce for their livestock and also sale to the other agro pastoralists when there is surplus and (2) commercial based fodder production which includes production of green fodder of maize/sorghum particularly in Gode area and production of commercial Sudan grass fodder by local agro pastoralists and local cooperatives respectively. Moreover, production of sesame oil seed cake (in Gode), ATMR and MNBs and wheat bran by local sesame oil seed processing mill owners, enterprises of ATMR and MNB producers and wheat flour factories respectively. In Somali region, major fodder production areas are categorized in to four areas , (1) In all Woredas along major Rivers such as Wabe Shabelle, Weyb, Genale and Dawa (2) areas which uses surface water , natural springs and

Boreholes such as Erer and Shinile districts, (3) areas which has high potential of Spate irrigation and this areas are very large and scattered across all zones of the region particularly, most districts of Jarar, Korahe, Parts of Shabelle, Afder, Liban Dawa, Jarar, Nogob and Siti zones and lastly (4) area which depended on rain fed and this areas include most Woredas of Fafan and Sitti zones. However, the current scale of production of all the subsistence and commercial fodder is very low compared to the existing livestock feed demand and market supply. Production of maize and sorghum either as green or residue is the leading fodder in the region followed by wheat brand by factories. Production of sesame oil seed is also low due to low support for farmers and poor market linkage of the oil seed cake as well. Producer of commercial Sudan grass which are mostly the better off individuals or cooperatives are mostly rush in to the production when there is drought in the region. MNB and ATMR producers are also two in number (only in Erer and Jijiga towns) have better market during drought and most of the agro pastoral community do not have information and knowledge on the nutrition value of the product.

Generally, the market trend particularly the demand for all fodder types has been increasing in the region but the supply was very low and that is the reason for huge quantity of fodder such as hay of natural pasture from Sululta, Urea, Molasses and Bagasse from Matahara was supplied to the region during the recent drought of 2014-2017. Although residue of maize and sorghum are competitive in the agro pastoral areas during dry seasons, both the sorghum/maize green fodder and residue are highly competitive during drought time with high demand and increased prices. Despite, the current low production of wheat bran in factories, the wheat bran market is competitive due to existence of several factories in Jigjiga Dire Dawa towns. Generally, the prospect for fodder value chain development is good in the future due to the prevailing opportunities such as availability of land, water, conducive government policy to support the fodder sector development , community awareness on cultivation and marketing of different fodder types and readiness of the NGOs and Donors to support the sector.

The fodder value chain actor in the study area include agro pastoralists, cooperatives of MNB producers, enterprises of ATMR producers, wheat flour factories which produce wheat bran and wheat middling and sesame oil seed cake locally known as (Mankaal). Fodder transportation is carried out by donkey carts, camel pack and trucks. Fodder traders are also wheat bran, green

maize/residue, Sudan grass and sesame oil seed cake traders and retailer including concentrate of maize. Fodder consumers also include agro pastoralists, pastoralists, livestock traders, and urban and peri-urban livestock keepers. All the producers of crop residue, green fodder and industrial by product have a strategic plan for marketing of the product to be used as livestock feed by their customers.

There are many constraints within the fodder value chain in the study areas. The major constraints are related to low level of capacity in fodder production, processing, constraints on transportation and poor market linkage between fodder producers, traders and consumers. Poor access to input, equipments such as tools and tractors, lack of transportation facilities and poor road network facilities , lack of access to microfinance institutions to fodder producers, processors and traders, poor post harvest system, storage facilities and lack of knowledge and skills on value addition, preservation, packaging and processing.

Although the current fodder types and sources vary from place to place across the study sites, processing and value addition is totally missing particularly in the green and residue of sorghum/maize in the respective study areas. There is no chopping, bailing, grading, storing, hay making and storing practices the study sites. Therefore, significant quantity of residue is always lost during harvesting by poor harvesting system and wind a well. Although sesame oil seed is processed with local mills, there is no any kind of value addition such as sorting, grading and proper packaging for the by product. After harvesting, the producers use bailing box for Sudan grass and the size of the box currently in use is 25 Kg or the length, Width and Height of the box is L * W * H (1m x 0.50m x 0.50m =0.25 $M^{3)}$ but the producers in Gode area measure 20 Kg when selling the hay to consumers or particularly to the government and NGOs. There is no market place for the bailed hay whereas the buyers purchase from the farm gate. There is no adequate knowledge transfer by the extension service in terms of processing, grading, packaging and storage of the fodder in all study areas. Although, the current fodder marketing has rewarding to the producers, traders, retailers and transporters, there has little involvement on value creation and knowledge transfer in fodder marketing by the Government institutions and NGOs in terms of marketing information, provision of training, capacity building , and creating access to microfinance institutions.

The market transactions of roughage such as residues and green fodder of cereals (maize and sorghum), Agro Industrial By Products (AIBP) (wheat bran, wheat middling, sesame oil seed cake) and mixed feeds such as Activated Total Mixed Ration (ATMR) and Multi Nutrient Blocks (MNB) is showing increasing trend, even though its size is still small considering the livestock population of Somali Region. Crop residues and green fodder such as sorghum and maize are the most marketable roughage feed in all the study districts and used as supplementary feed for livestock. Natural pasture areas particularly in Harorays and Shabelay districts are declining overtime due to the expansion of crop cultivation and urbanization. Crop residues and green fodder of particularly sorghum is also exported to the neighboring Somali Land such as Wajale town from Harorays and Shabellay districts. The study shows that marketing of natural pasture hay is totally absent in the study districts except by Jijiga, Gode and Dire Dawa air port which sell the hay to the nearby pastoralists and sometimes donate freely during severe drought period. The air ports do not have strategic plan of fodder production and marketing whereas the hay is grown due to the fence of the air port and hay is harvested and sold as a safety precaution against unexpected fire incident within the air port premises as the result of the dry pasture. Hence, in most of the study areas there is an acute shortage of natural pasture hay supply in domestic market. The most commonly marketed AIBPs in the study area are wheat bran and wheat middling particularly in Harorays, Shabelay, Shinile and Erer study areas and sesame oil seed cake in Gode study area. In general, commercial feed supply is emerging in urban and peri-urban parts of the study areas. The use of feed from commercial sources is, however, very limited due to shortage of feed supply and inefficient marketing system and this problem become more serious in rural areas. There are many small size mills that process maize, sorghum and wheat in most towns and in some rural areas. But the fodder by product is not like that of wheat factories since fodder is obtained manually before the grain is processed or grinded in the mills. There are many women which do this job. These women take the fodder for themselves along with the charging feed paid for the cleaning or winnowing of the grain and collect the fodder to sell later on for the livestock owners. This issue is mostly common in all the study area but its capacity is limited as fodder is obtained manually.

In most of the potential peri-urban and urban areas of the study areas, there is feed availability problem due to overgrazing of the areas, agricultural land expansion and settlement areas. Hence, there is a need for interventions to develop feed production and marketing in Somali Region.

Therefore, in order to promote livestock production, the feed production and marketing aspect need to get due attention. Interventions to increase the feed supply, improving feed formulations both in the nutritional and economic area and developing feeding strategy based on locally available feed resources are urgently needed which could vary depending on the resource base of a particular intervention area.

Moreover, ways should be devised for the better conservation, utilization and marketing of conventional feed resources produced as natural pasture hay, crop residue and improved forage hay such as Sudan Grass. In regards to fostering the industrial by products marketing, livestock production in Somali Region should be commercialized (market-oriented) and feed marketing aspects have to receive at most focus and attention. In order to achieve commercialized livestock production system, an enabling environment including strategic policy in livestock feed marketing is the most important aspect that needs to be addressed and implemented in a value-chain approach. On the other hand, unless there is a wider investment in the sector mainly in modern/commercialized livestock farming (dairy, fattening, poultry etc.), the demand for AIBP such as sesame oil seed cake and wheat bran and mixed feed types such as ATMR and MNB will remain low.

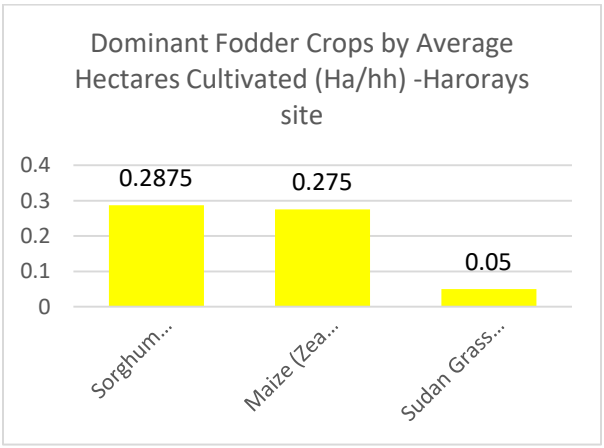
Thus, it is important that there is a planned encouragement of commercialized livestock farming where the existing resources mainly the feed resource are utilized efficiently. On top of this, there is also an opportunity for private sectors to enter into the feed mill industry if the market can be formed and expanded. Consequently, it is also important to support the private sectors to enter into the feed mill industry so as to supply affordable feeds for modern livestock.

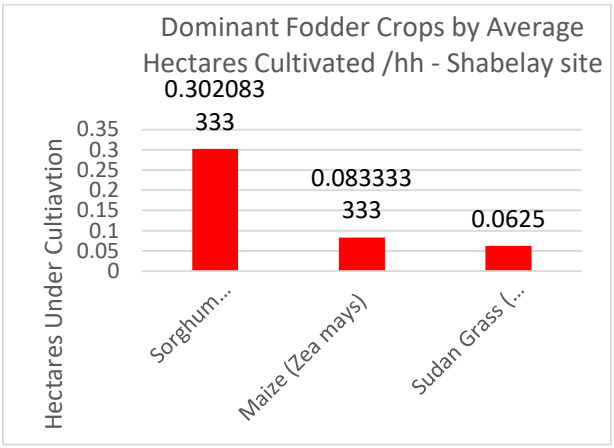
5.1 Fodder Production by Agro pastoralists

Many types of fodder are produced, processed, marketed and consumed in the study areas. But the major cultivated ones have been used for the analysis of this study. The agro pastoralist produce different types of fodder such as crop residue of sorghum & maize, green fodder of maize & sorghum, natural pasture (green grass near farm plots) and Sudan grass. While they provide the fodder thus cultivated particularly maize and sorghum (both green and residue) and Sudan grass to their livestock, the surplus is also sold to other agro pastoralists, pastoralists, urban and peri-urban livestock keepers, and livestock traders etc. On the other hand, there are other fodder types (wheat

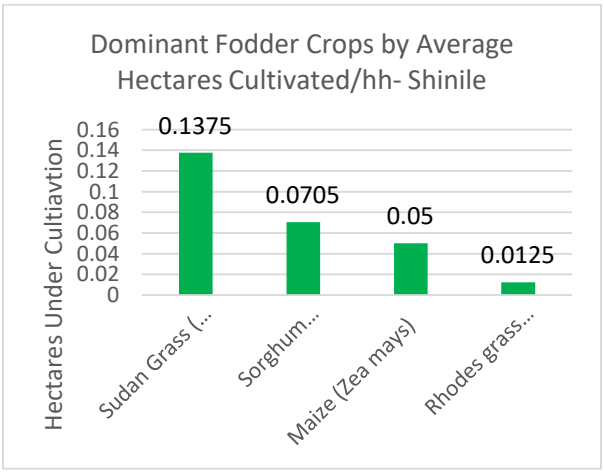
bran) which is produced by local wheat flour factories particularly in Dire Dawa, and Jijiga towns and small sesame oil seed processing mills which also produce oil seed cake as a byproduct of sesame (Gode town), Activated Total Mixed Ration (Jijiga town), and Multi-Nutrient Block (Erer and Jigjiga towns). The following figures depict the types of fodder produced by the agro pastoralists and the types of fodder purchased by the livestock owners from the local fodder markets in each study sites of Harorays (Jijiga-North), Shabelay (Jijiga south), Shinile, Erer and Gode respectively.

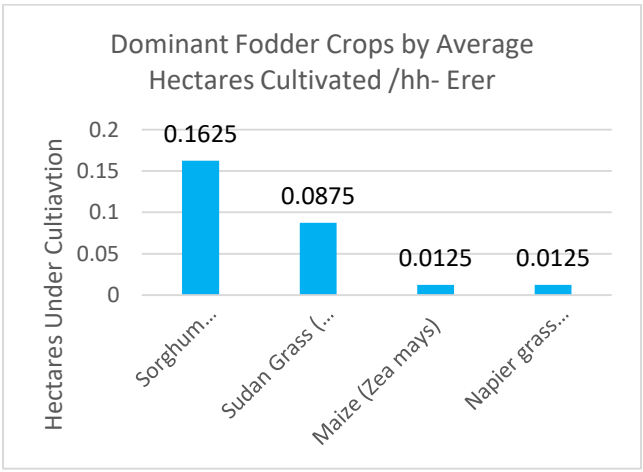
Figures (a and b)

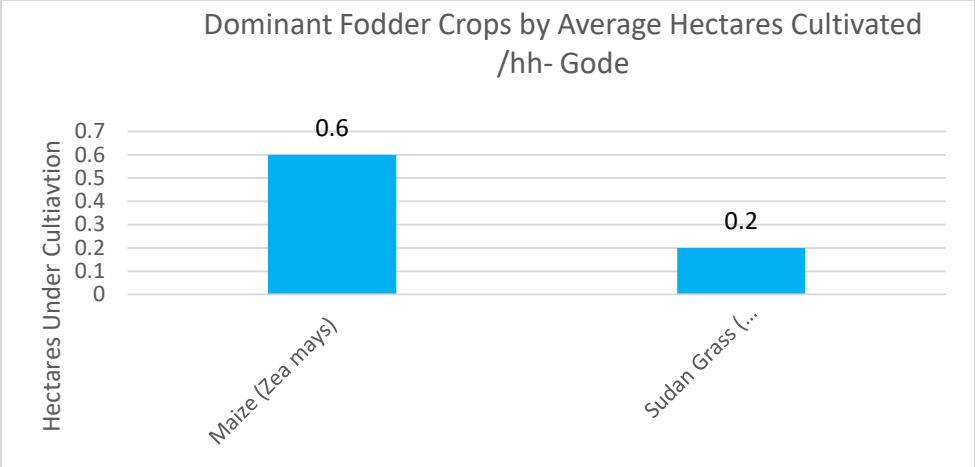




Figures (c , d &e)





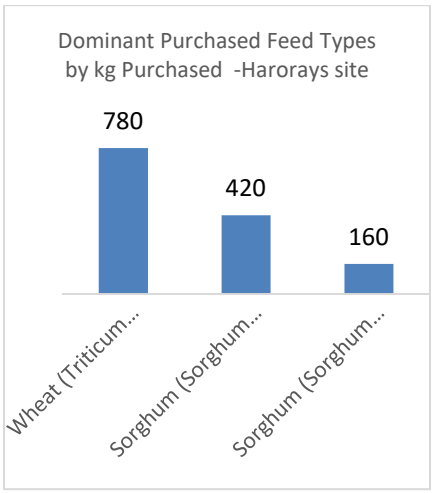


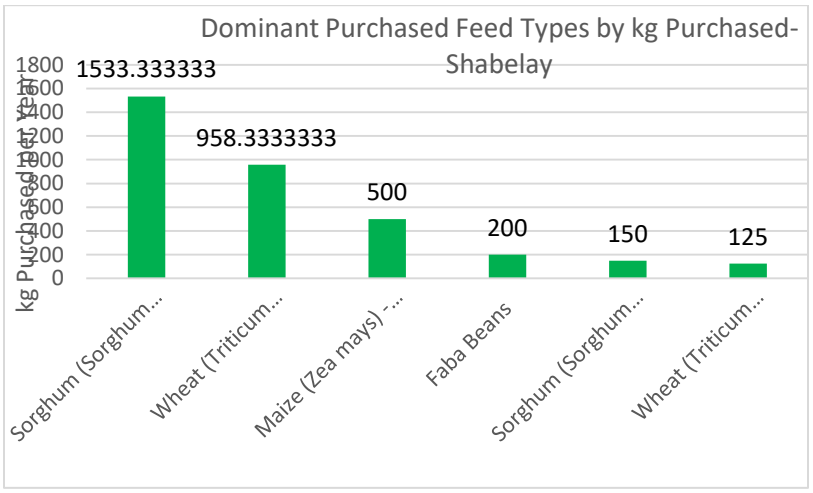
The above graphs suggest that among the five study sites, Gode and Harorays districts showed better cultivation of maize for fodder purpose. Moreover, Shabelay and Harorays district showed better cultivation of sorghum for fodder purpose followed by Erer and Shinile study sites respectively. In Gode site, there was no data for cultivation of sorghum but instead Gode sites showed better in the cultivation of Sudan Grass for livestock feed purpose followed by Shabelay and Harorays study sites. The above differences has been suggested by the respective focus group discussion that in Harorays the agro pastoralist do not wait the maize until full maturity and they cut the maize plant after 45 days of planting and either sell to other sell the fodder to Gode town livestock keepers or they use for livestock. In Harorays site sorghum is the staple food and they wait until it becomes mature where as they cut the maize before maturity and use it as fodder for their livestock in most cases. The focus group discussions in Shabelay, Harorays, Shinile and Erer revealed high tendency of the agro pastoralists in those districts to cultivate sorghum as a fodder during drought time.

5.2 Fodder purchase by the livestock owners

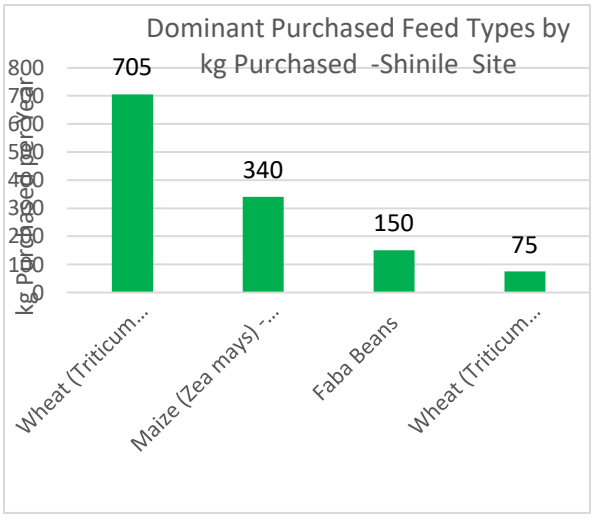
The types and magnitude of fodder purchased in the local market is also varied across the study site as depicted in the following graphs for the respective study of Harorays, Shabelay, Shinile, Erer and Gode study sites.

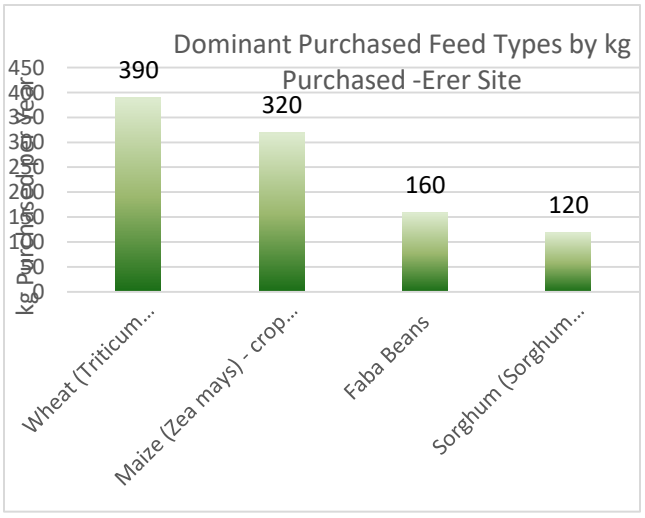
Figures (a) : Dominant purchased feed types in Harorays and Shabelay districts



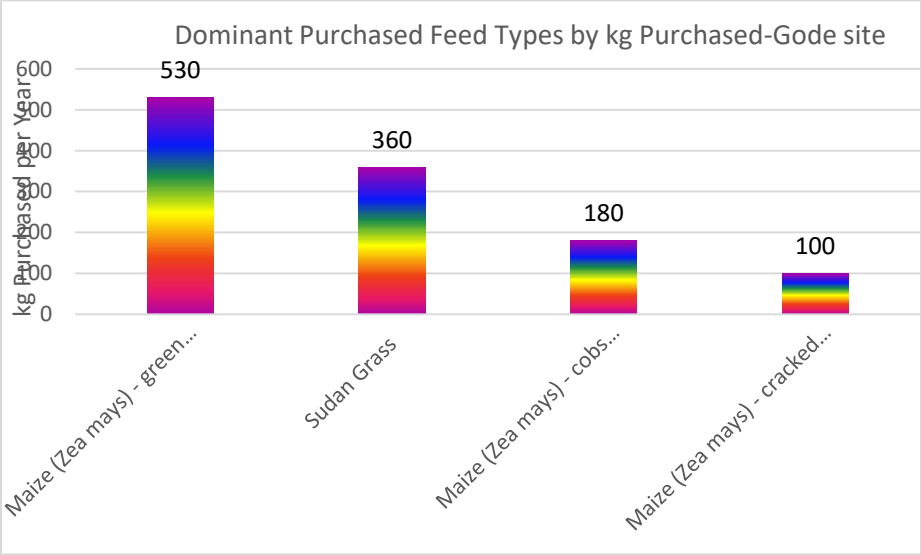


Figures (b) : Dominant purchased feed types in Shinile and Erer Districts





Figures (c) : Dominant purchased feed types in Gode district



The above charts depict that purchase of Sorghum residue as fodder was higher in Shabelay district and followed by Harorays district (1533 Kg and 420 Kg respectively in a given dry season respectively). Similarly, the purchase of wheat bran was higher by Shabelay, Harorays and Shinile livestock owners with 980 Kg, 780 Kg and 705 Kg per HH respectively in a given dry season compared to others sites. This might be due to proximity of those districts to the wheat flour factories in Jijiga and Dire Dawa. Obviously, there is purchase of wheat bran by livestock owners in Erer district but there was no any purchase of wheat bran by Gode livestock owners. In Gode site, one of the focus group discussion suggest , due to lack of wheat flour factories in Gode, livestock owners buy maize grains and grind in the local grinding mill to feed their livestock and as a result, the amount of such maize concentrate purchased by livestock owners was about 100kg per HH per season on average. The purchase of Sudan grass as a fodder has only been mentioned in FGD in Gode site and purchase of maize fodder as a residue was mostly common in all the four sites except in Gode where in Gode the purchase of green maize fodder was more common as compared to the residue.

5.3 Fodder production potential and adequacy

The frequently produced and marketed fodder types came from two major sources, that which produced by the farmers and marketed among the agro pastoralists and that produced by wheat flour factories and other sources such as processers of sesame oil seed, ATMR and MNB.

The trend data of produced and purchased sesame oil seed cake was not available where as it is true that the ATMR and MNB is mostly purchased by the NGOs and Government to support the drought affected areas and for the government supported fattening pilot projects such as BBC (local know as water, food and feed) and this is being under pilot in all the 93 districts and four city administration councils of the Ethiopian Somali Regional state (one site per district or per city council). In this pilot project, the government has provided 2 Ha of land , 25 shoat, and 5 cattle per house hold covered along with the with Sudan grass and cereal crops including the provision of livestock feedlot, residential houses and six month food until the settlers harvest their own crops.

Generally, the agro-pastoralists in the study areas have the potential to produce an average a huge amount of feed and can feed their livestock and market the surplus despite the existing constraints in the livestock feed development sector. The number of animals that a given amount of fodder can support in the system will depend on several factors. Some of these include the digestibility of the fodder, the levels and digestible availability of the forages' nutrients (energy and protein), and the species of animals (cattle, sheep and goats) and their feed-dependent physiological status (growing, pregnant, lactating) (NRC, 2007). ***The following data has been analyzed with the help of Livestock Feed Assessment Tool developed by ILRI*** and the charts indicate the percentage of Dry matter Intake (DM), Crude Protein (CP) and Metabolizable Energy (ME) and provide some information on the common feed products assessed in Harorays, Shabelay, Shinile, Erer and Gode specific study sites respectively.

Figure (a): DM, ME, and CP intake of the available fodder types in Harorays district

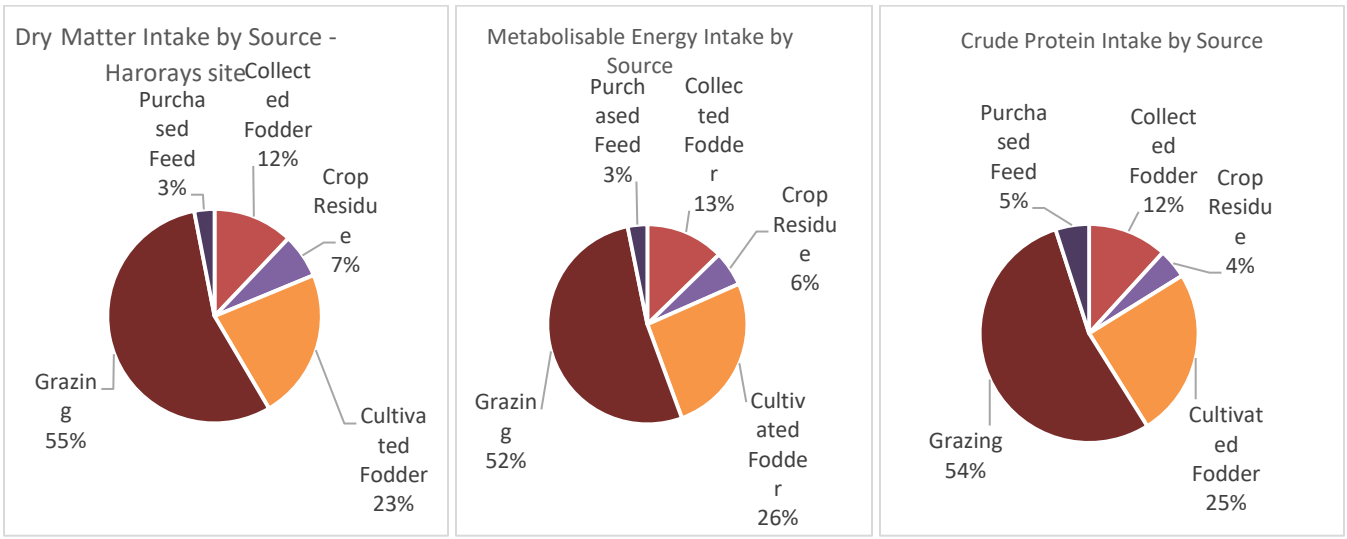


Figure (b): DM, ME, and CP intake of the available fodder types in Shabellay District

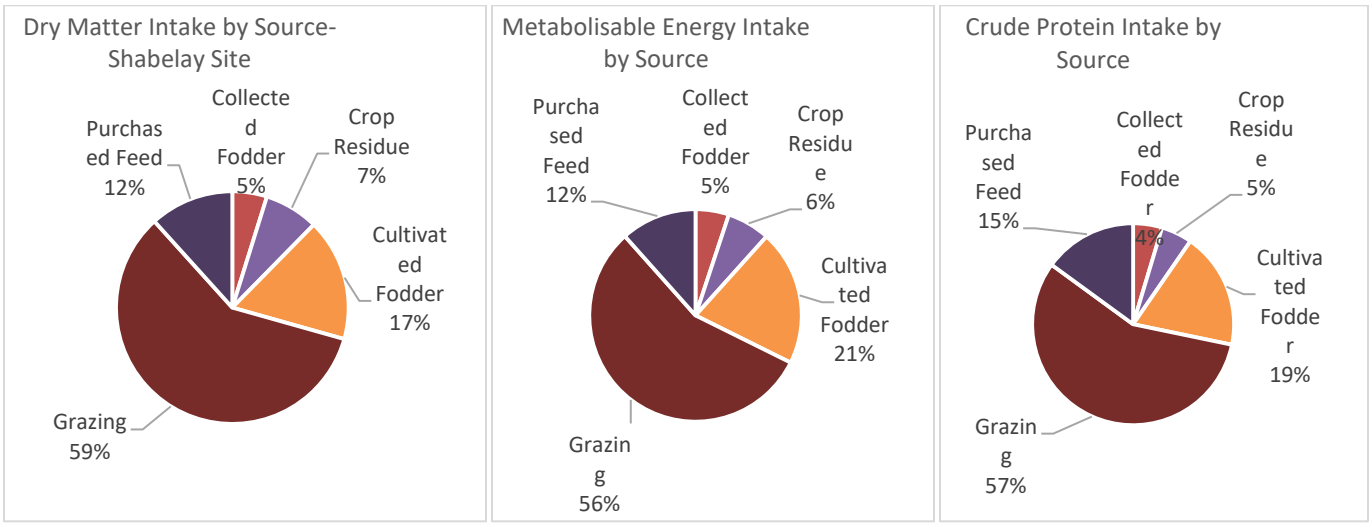


Figure (c): DM, ME, and CP intake of the available fodder types in Shinile District

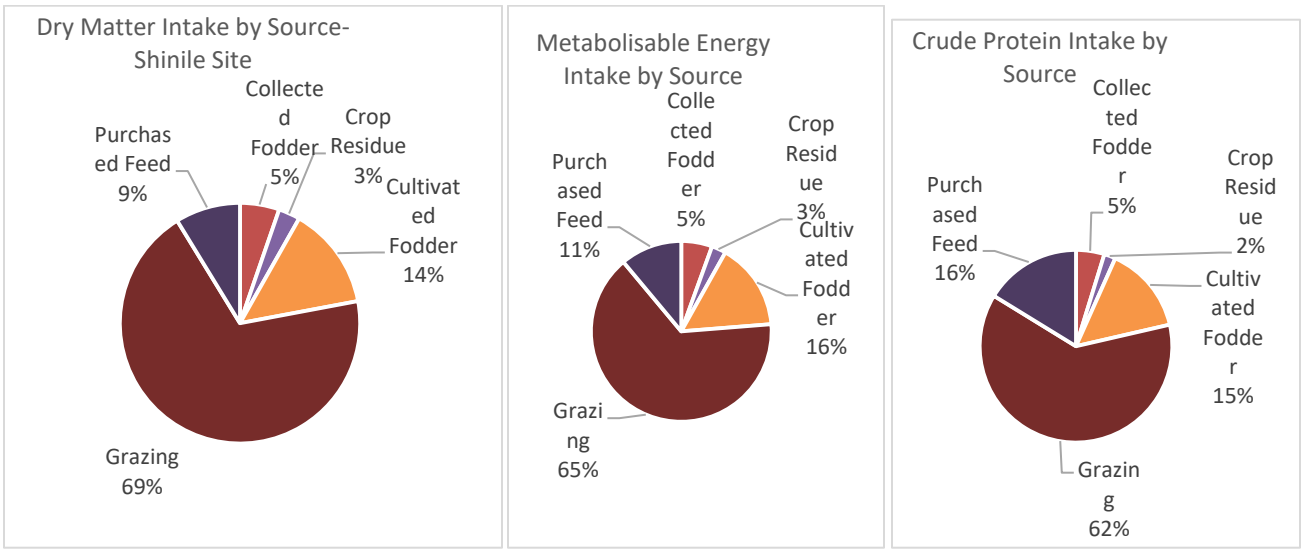


Figure (d): DM, ME, and CP intake of the available fodder types in Erer District

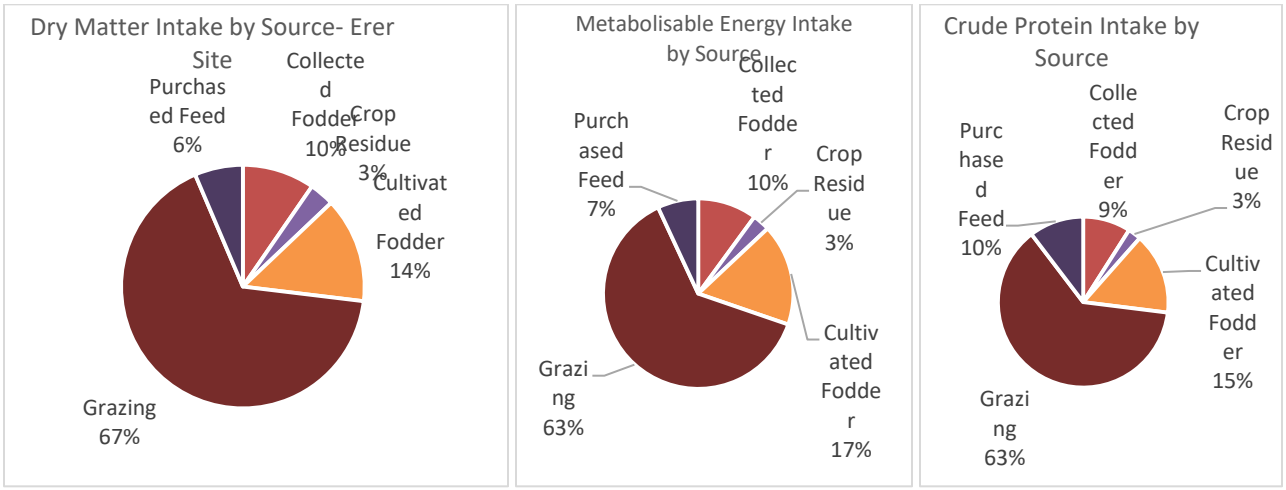
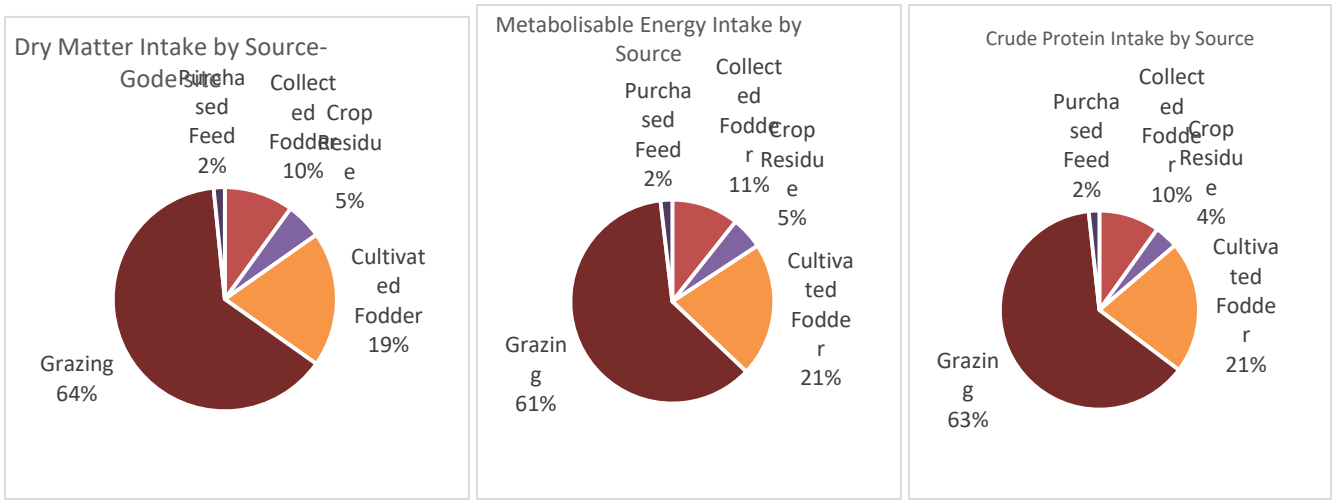


Figure (e): **DM, ME, and CP intake of the available fodder types in Gode District**



The above charts depict that, the DM derived from the natural pasture in Shinile, Erer and Gode have the highest DM intake of 69 %, 67% and 64 % respectively as compared to Harorays and Shabelay districts (55% and 59% respectively). In reference to the Metabolizable Energy (ME) derived from the cultivated fodder Harorays was the leading (26%) followed by Shabelay and Gode (21 % each).

In regards to the amount of Crude Protein (CP) derived from the purchased feed by the livestock , Shinile , Shabelay and Erer has better Crude Protein status of 16%, 15% and 10% respectively as compared to Harorays, and Gode study sites 2 % and 3% respectively.

5.4 Rainfall variability and fodder Availability in the study sites

Rainfall is the key determining factor for fodder production in the study area. Obviously, Harorays and Shabelay districts depend on the natural precipitation of Gu/Belg and Karan/Kiremt rainfall for the performance of fodder. Although the natural precipitation is essential for the optimum performance of pasture production , Shinile, Erer and Gode study areas have alternative water sources for irrigated crops which constitute borehole and Surface water (spring water) for Shinile , surface water for Erer district and the Wabe Shabelle River for Gode. The following charts depict the rainfall variability and availability of fodder in Harorays, Shabelay, Shinile, Erer and Gode study districts.

Figure (a): Rainfall variability and fodder availability in Harorays district

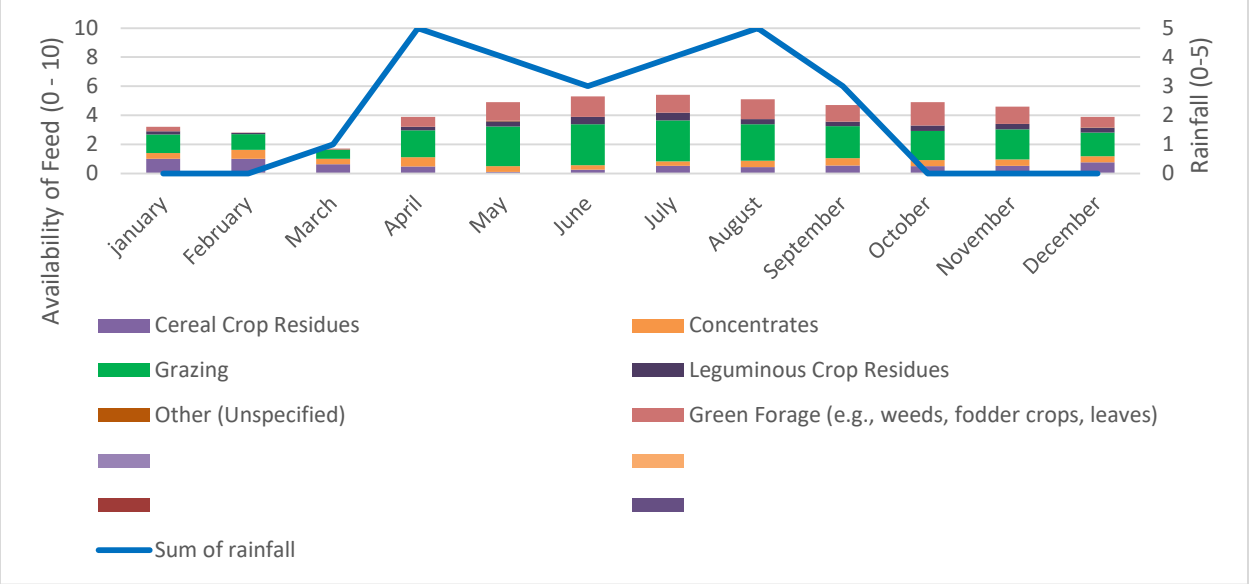


Figure (b): Rainfall variability and fodder availability in Shabelay district

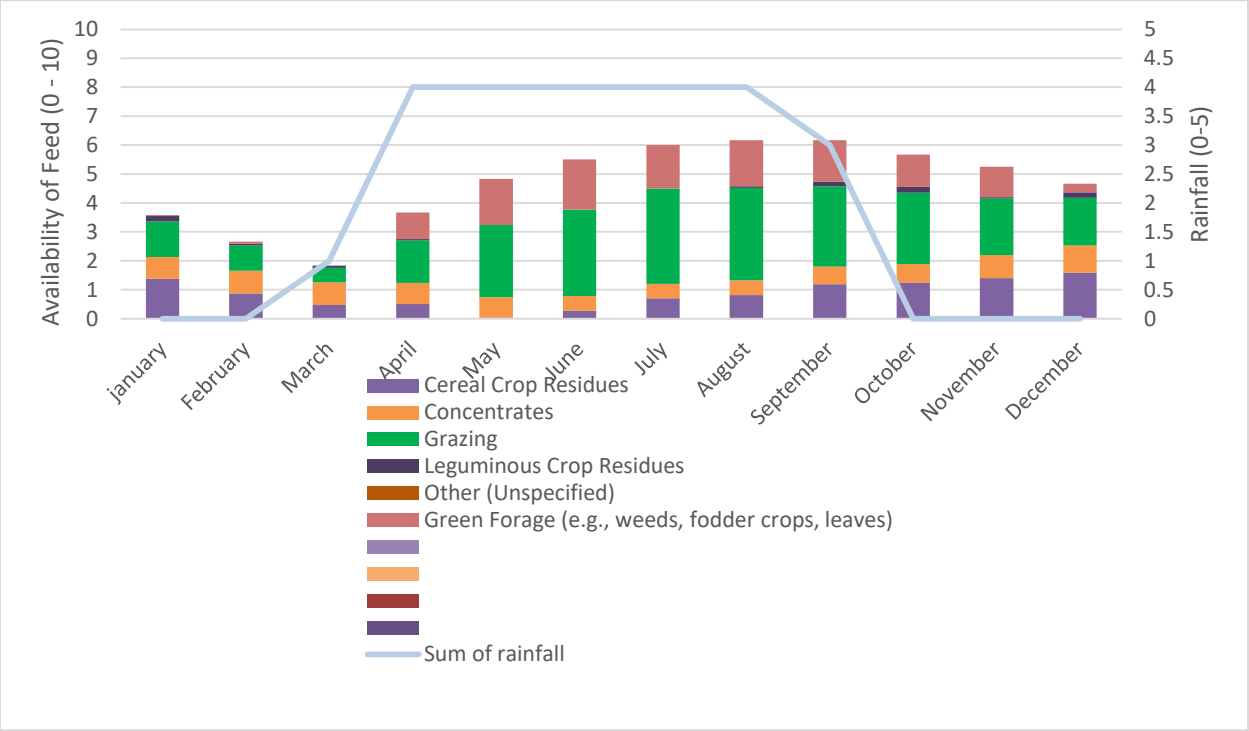


Figure (c): Rainfall variability and fodder availability in Shinile district

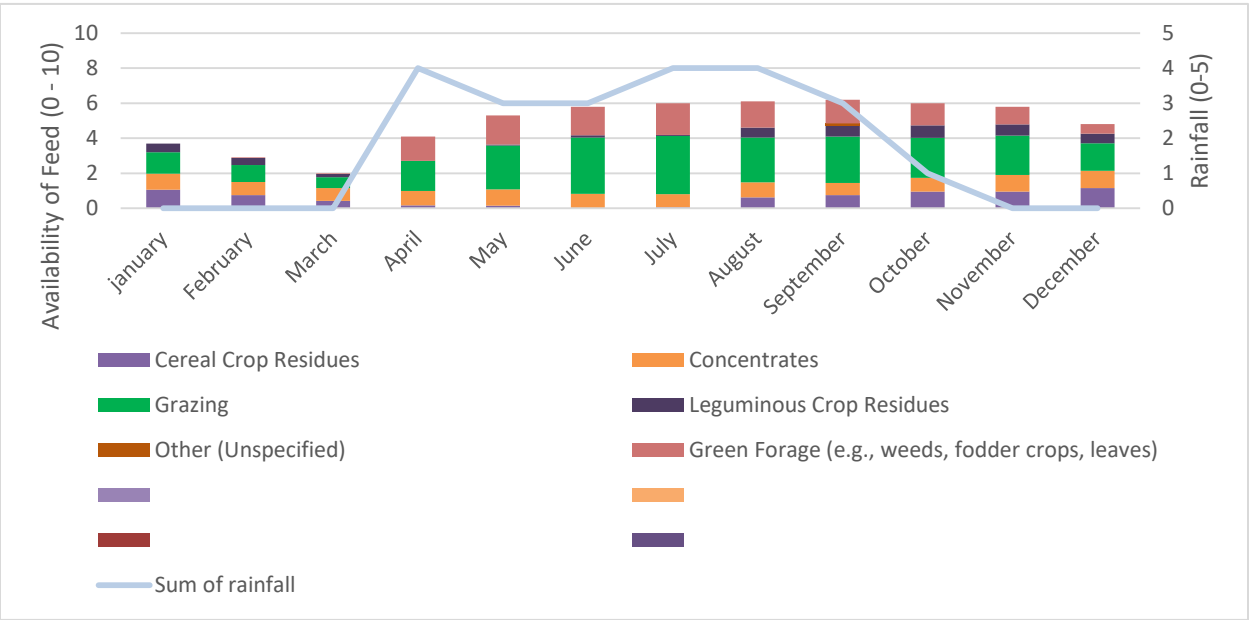


Figure (d): Rainfall variability and fodder availability in Erer district

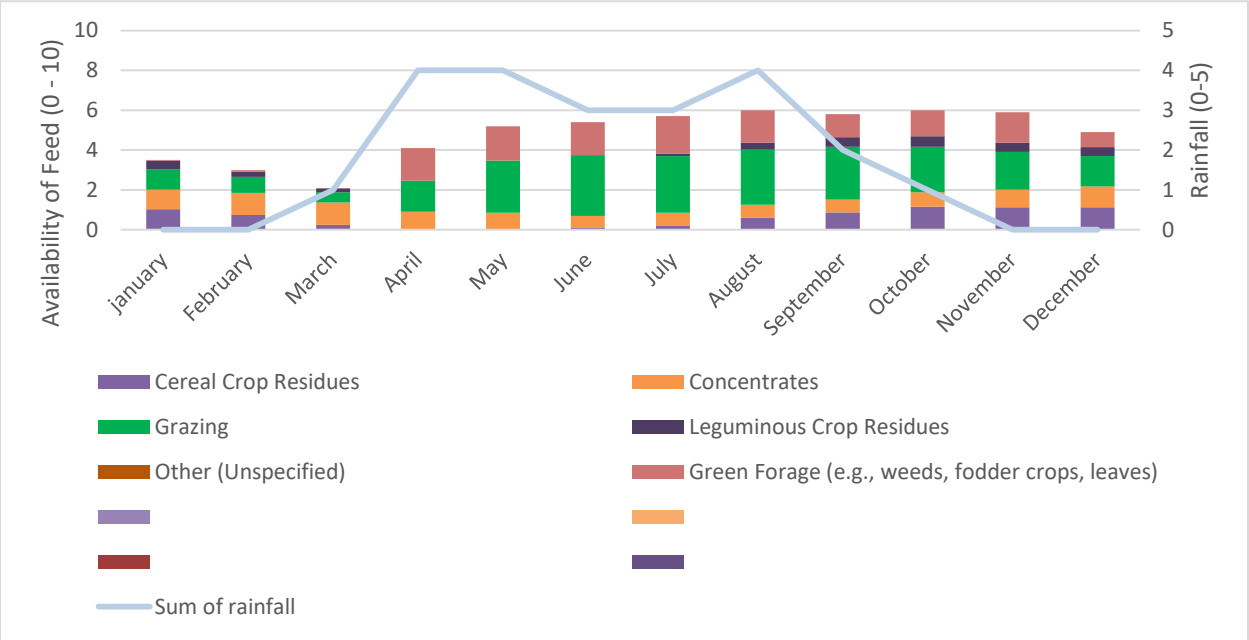
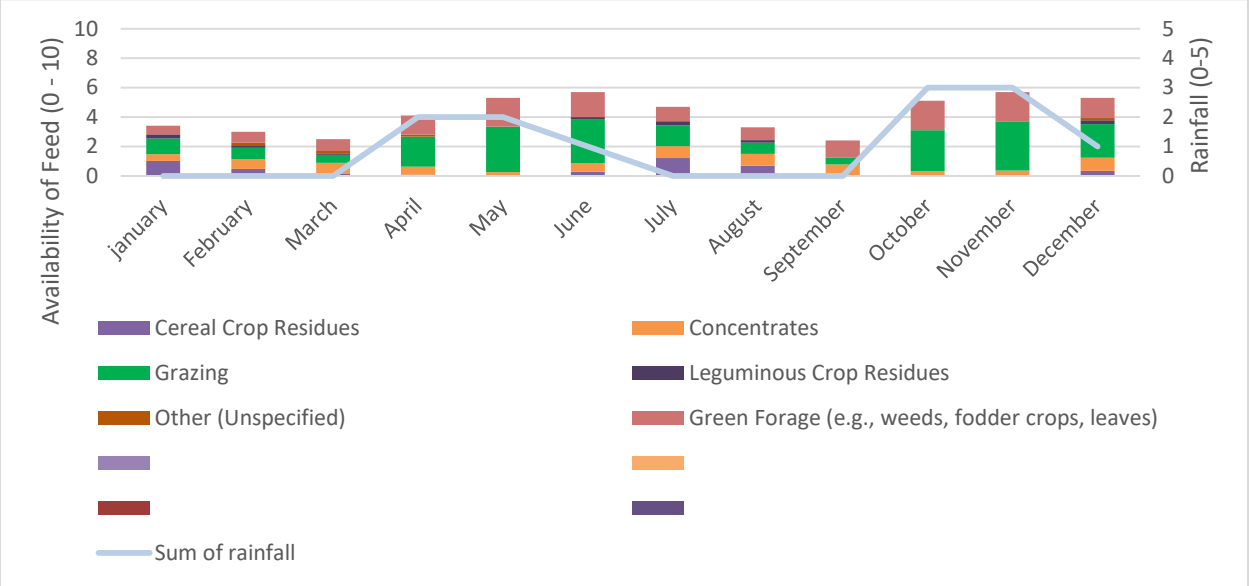


Figure (e) : Rainfall variability and fodder availability in Gode district



The above charts depict, Harorays, Shabelay, Shinile and Erer districts have relatively closer rainfall pattern due to the similarity of their rainfall seasons. Based on this, the four distracts are Dira'a and Karan rainfall receiving areas of the region and show similar pattern in terms of feed availability as well. Generally, natural pasture/grazing, green forage (such as fodder crops and leaves etc) are available from April- September/October and the trend declines from mid October to March for those districts. High demand for feed such as crop residue and concentrate also start from

January –March and from November to December which corresponding to the dry season. Unlike the above districts, Gode district has different rainfall pattern as the area is Gu/Belg and Deyr/Meher rainfall receiving area of the region. Due to this reason, availability in terms quantity and quality of fodder is the main challenge during dry season. Normally, natural pasture and green forage are available from mid April to Mid may and then shows dramatic decline from Mid July – September as evapo-transpiration highly exceeds the mean annual precipitation of the study area.

5.5 Agro pastoralists' major income sources

The below charts depict the major income sources on which the livelihood of the people is based

Figure (a) : Major types of income sources in Harorays and Shabelay districts (study kebeles)

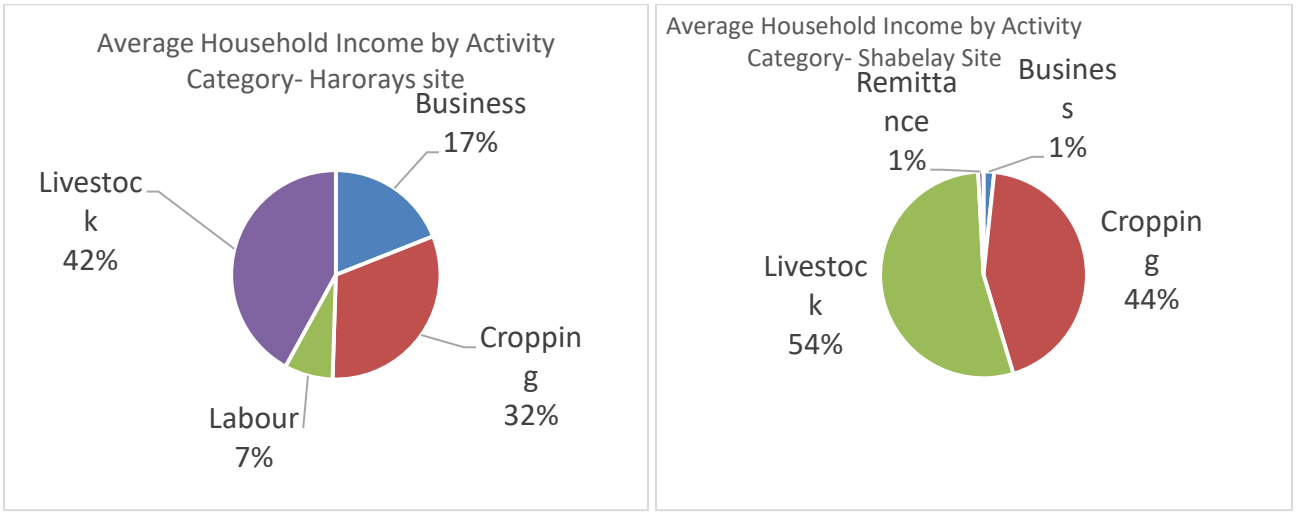


Figure (b) : Major types of income sources in Shinile and Erer districts (study kebeles)

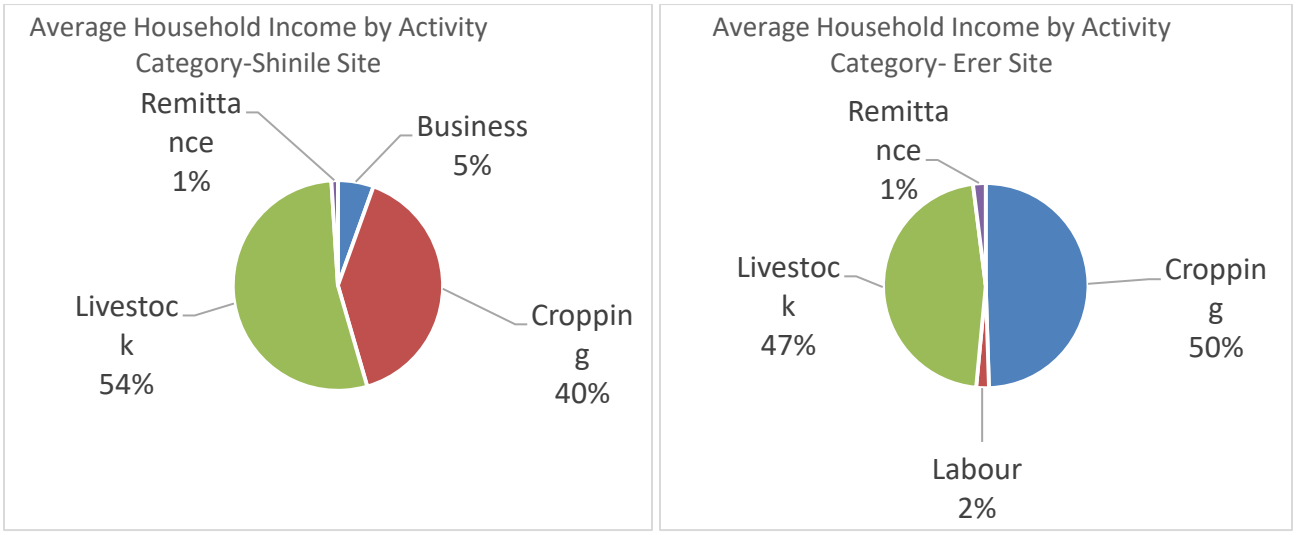
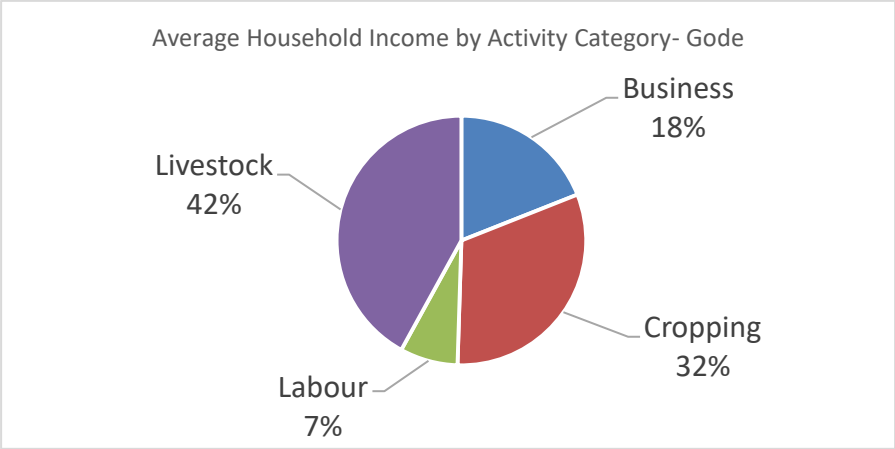


Figure (c) : Major types of income sources in Gode districts (study kebeles)



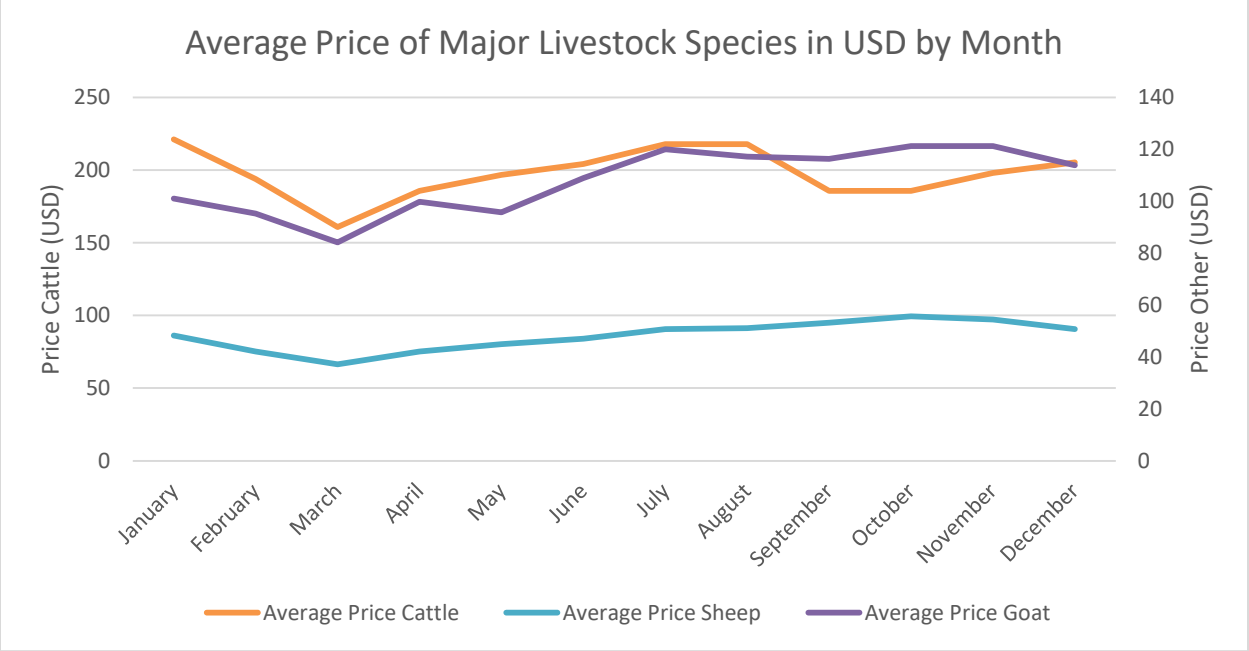
The above chart shows, crop production is the dominant livelihood types in Harorays, Erer and Shabelay study area with 52 %, 50% and 43% respectively followed by Gode and Shinile. Likewise, the livestock husbandry is the dominant livelihood type in Shinile, Shabelay and Erer with 54%, 54% and 46 % respectively followed by Gode and Harorays.

5.6 Impact of seasonal feed variability on livestock milk productivity and prices

The below charts depict the impact of seasonal variability of wet and dry seasons on livestock milk yield and prices in the study area. The total milk yield per household per day and the livestock market price has been analyzed with the main objective of understanding the quantity of marketed milk and quantity retained for the household consumption and the quantity of milk the household expends on feed purchase. Based on the data analysis, milk supply and livestock prices are low during the dry season in each agro ecology of the respective study areas. Except for Gode district which is Deyr/Meher rainfall receiver, the remaining four study areas have shown low livestock prices, low milk yield and high milk prices during dry season (December –March). The study showed that Agro pastoralists in Gode and Erer districts spend 14% and 25 % of their milk income (earnings) on livestock feed purchase annually. This figure has been higher for Harorays, Shabelay and Shinile study areas with 49%, 46% and 32 % respectively per year by agro pastoralists which is also an indication of high fodder scarcity or high price of fodder. Regarding to livestock off take pattern for cattle and shoat (goat and sheep) across the study areas, the average off take was between 2-3 % per year for cattle and shoat. (For detail statistical data refer Annex-A at the end of this report).

The following figures show the livestock market price (USD) versus price received per head and milk yield in litter against price (USD) received per litter for each of the study districts. The prices in this report are based on market prices of 2017/2018 in the study area. The exchange rate during this period was 1 USD = 27 birr. Average milk yield (L) is yield obtained per household per day.

Figure (a): Average prices of major livestock and average price of milk in Harorays district (study kebeles)



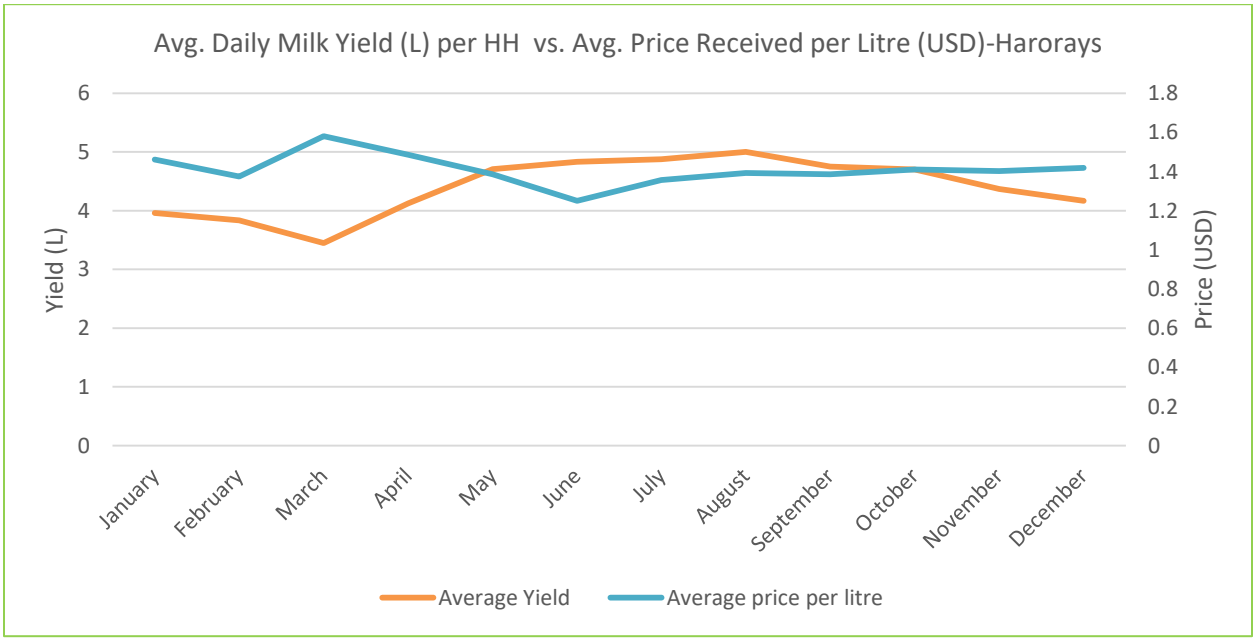


Figure (b): Average prices of major livestock and average price of milk in Shabelay district (study kebeles)

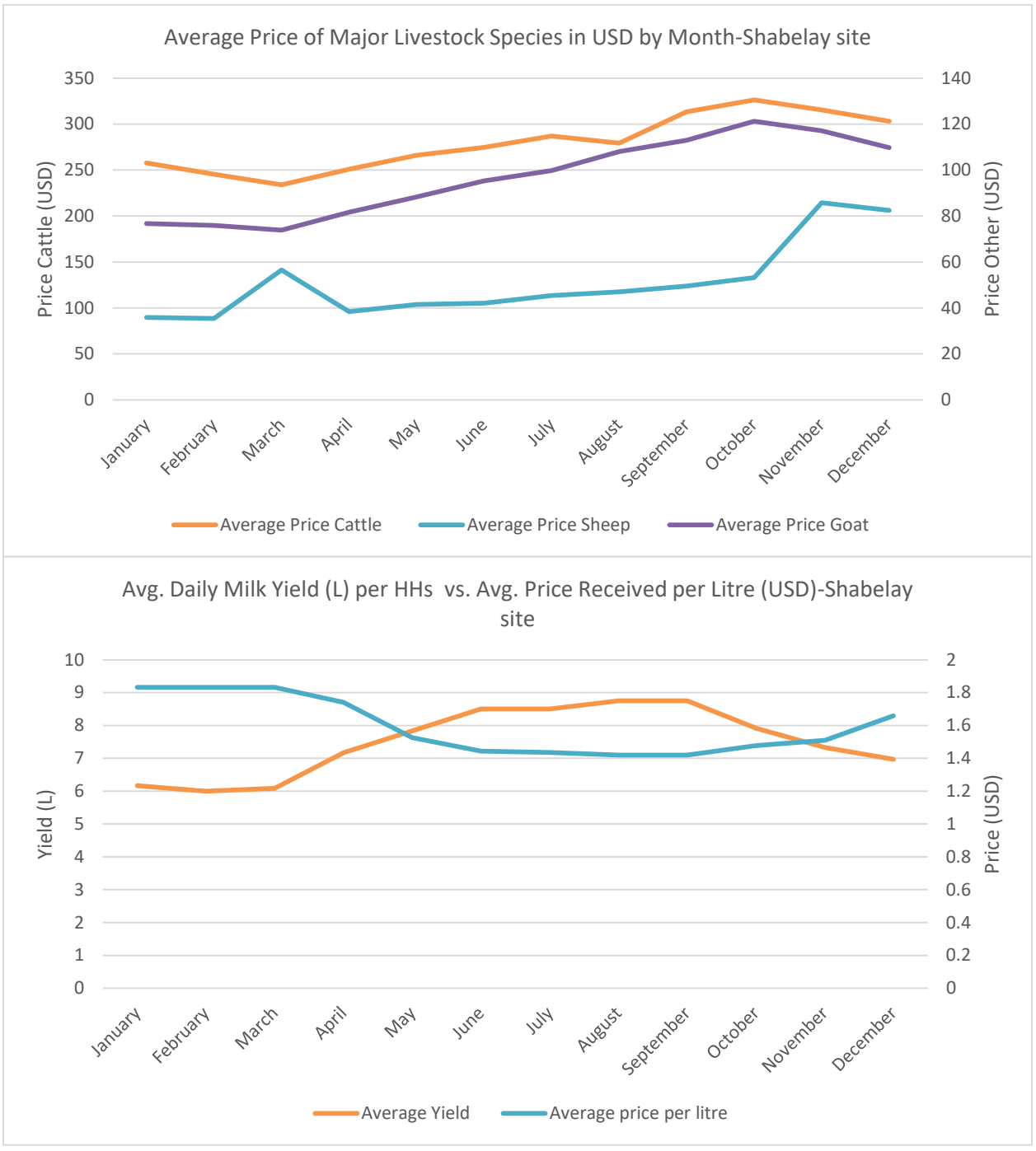
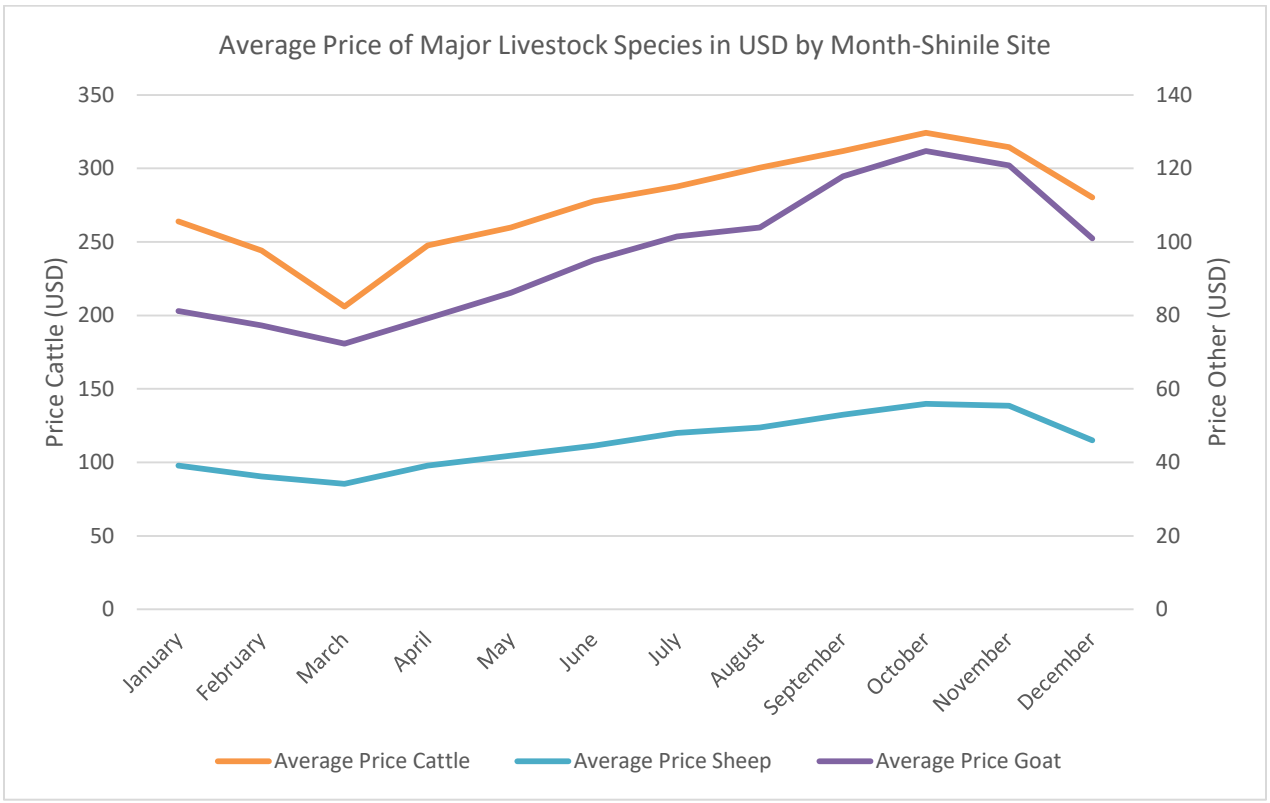


Figure (c) : Average prices of major livestock and average price of milk in Shinile district (study kebeles)



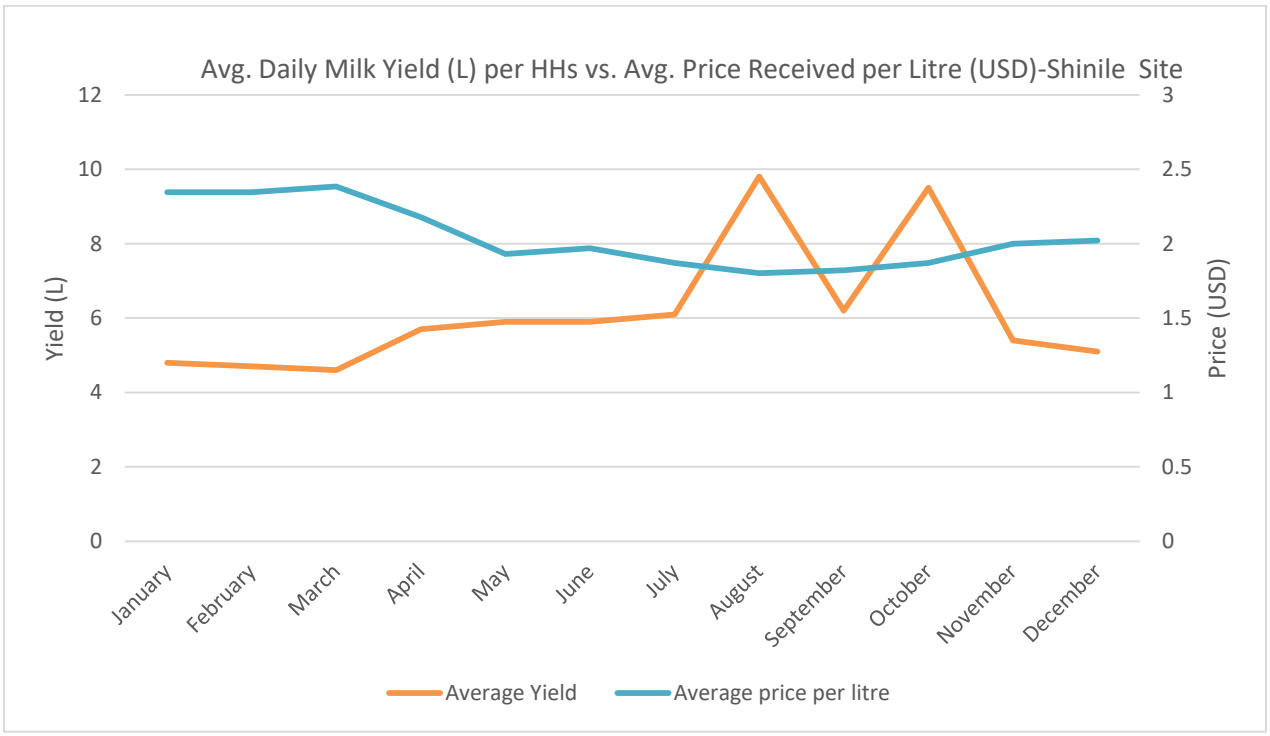


Figure (d) : Average prices of major livestock and average price of milk in Erer district (study kebeles)

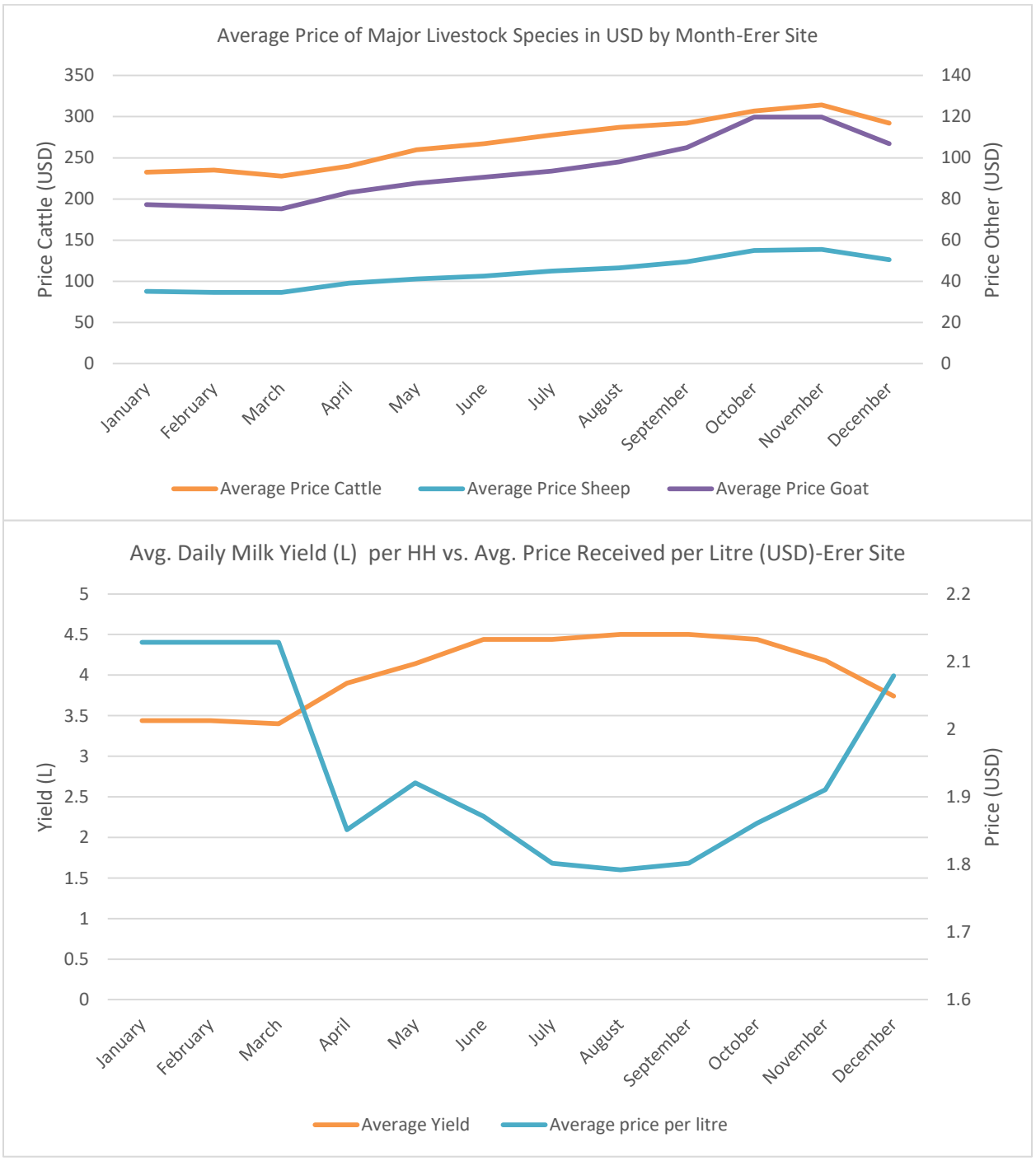
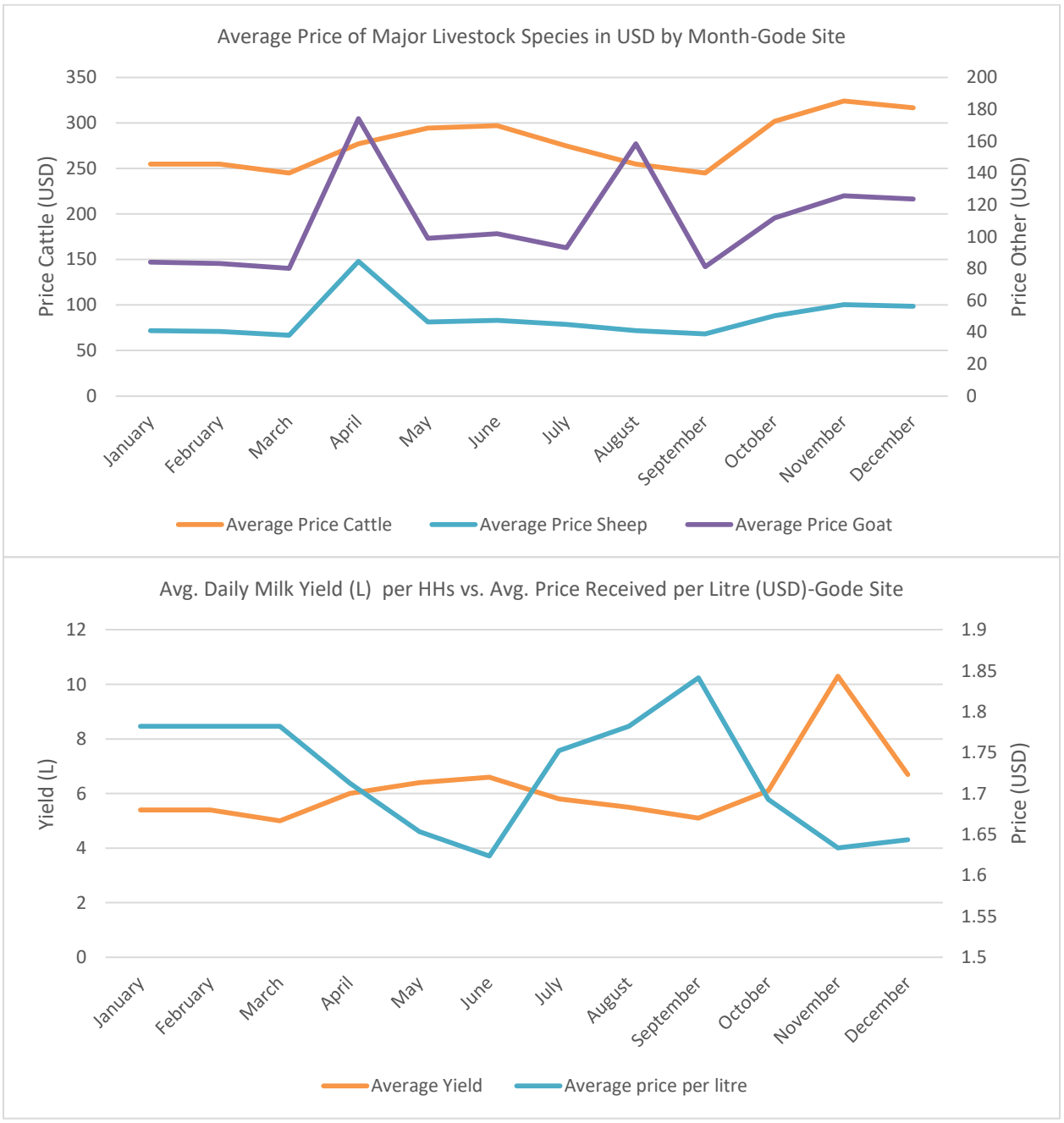


Figure (e) : Average prices of major livestock and average price of milk in Gode district (study kebeles)



5.7 Benefits to the actors

5.7.1 Benefit to the Producers

Across all the study sites, the focus group discussions reveal that selling fodder either as crop residue or green fodder of maize and sorghum may not be their primary objective for most of them where as on farm use of the fodder enable them to sustain more cattle from drought, earn income from milk, livestock off-take and the sale of surplus fodder to other agro pastoralists.

Across all the five study sites, access to land is through ownership, mostly by inheritance or through sharecropping. Obviously, Harorays and Shabelay study sites depend on rain fed for crop production where Shinile and Erer study sites utilize borehole and surface water for irrigation to satisfy the crop water requirement. However, in Gode site the major water source for irrigating crops is the Wabe Shabelle River which requires lifting the water from the river with water pumps to the field water intake and then to the irrigation channels. The major driving force here is the water pump. Almost 90% of the agro pastoralists in Gode have access to water pumps either as cooperative or individual small holders. Most of the water pumps are Indian Anil, Indian Arrow, Chinese CHANKFA and all are single cylinder diesel engines.

Moreover, there are other types like Lumbardini(4 cylinders) , Caprari electrical pumps and other types current in use by the farmers. Most of the water pumps have been donated by government and many other have been donated by FAO, SOS, and JICA etc. Improved fodder varieties have been tried and introduced by the Gode research Institute since 2008 where farmers have a acquired adequate knowledge of planting different varieties adaptable to their environment and nutritional benefit to their live livestock and this include Sudan grass, Rhodes grass, Napier grass, Lablab, Alfaalfa, Buffel grass etc . However, in all sites only Sudan grass has been adopted by the farmers in all the study sites. There are some bigger cooperative which have planted the Sudan grass for commercial purpose in Gode and its area (Berano district) in 2018. According to the information received from the zonal Administration of Shabele zone over 250, 000 bales of Sudan grass have been produced in 2018 by the local cooperatives for commercial purpose. The humanitarian partners operating in the region such as FAO, SCI, VSF-Swiss have also dispatched and transported from highland areas of the country different types of fodder that constitute Urea Molasses and Bagasse, MNB and ATMR to the drought affected areas of the region in 2017. Some other NGOs such as

5.7.2 Benefit to the fodder Transporters

Fodder transporters in the study areas constitute, camel pack, donkey pack, donkey carts and trucks although there are some who carry the fodder on their shoulders or backs. The basic capital required is one or two donkeys According to farmers in Gode study sites, a donkey cart can carry between 40 and 50 bundles of fresh maize Stover in one trip (0.30 - 0.50 tones/donkey carts).

This amount of green fodder contains a total of 1000 plants of either maize or sorghum Stover and a bundle contains from 20-25 plants of fresh maize or sorghum Stover. In the dry seasons, when fodder is scarce, the transporters become enterprising by buying fodder from the farmers and participating in selling these directly to livestock keepers. The net earnings then depend on the combinations of fodder types that the traders and transporters handle. Moreover, there are other transporters who transport from the market point to the homes of the livestock owners particularly in the case of Gode site and this transporter mostly use a wood wheel barrow and charge 0.20 USD per trip.

5.7.3 Benefit to the fodder Traders

There is variation in the way fodder is traded across the five study sites. Harorays, Shabelay, Shinile and Erer have same marketing system where the fodder is directly sold by the producer to the buyer. This fodder can be either a crop residue or a fresh green fodder of maize or sorghum Stover standing on the plot. However, in Gode study site there are traders who are involved in the marketing of the green Stover of maize or sorghum and the transaction takes place in the open market at Gode town. Most of the traders are women and they retail the fodder they have purchased from the farm get of the producers. Due to the hot temperature, donkey carts arrive in the before day break and transaction of the fodder should be completed before noon in order to minimize the water content loss of the fresh maize or sorghum Stover. The consumers or buyers also take further steps to maintain the fodder and keep in a cool place within their compound until consumed by the target livestock. Obviously the margin is coming from the sale of the fodder and the traders buy and sell during both the rainy and dry seasons, and their net values are determined by any variations in related costs and prices. Operational costs are negligible since they do not pay for use of the market points and there is no charge for a market.

5.7.4 Benefit to the livestock keepers

Obviously, the study show that, the fodder purchased is used to feed the animals, and the resulting livestock off-take represented by reproduction, growth and body maintenance, milk production and sale of live animals. The agro pastoralist income is influenced by the body and condition of their animals and productivity as well. Low fodder availability triggers lower milk productivity and poor market demand for their livestock. The overall income then affected by the nutrient contributed by the fodder given to the livestock, which in turn affects the farms' livestock off-takes and productivity in milk.

5.8 Key players in the Chain Support Systems

Agricultural Transformation Agency (ATA)

The ATA is the national agency for catalyzing positive, transformational and sustainable change in the Ethiopian agricultural sector, which promotes existing structures of Government, private sector and non-governmental partners to address systemic bottlenecks in delivering on a priority national agenda for achieving growth and food security (Cf. http://www.ata.gov.et).

Bureau of Agriculture and Natural Resource Development and Bureau of Livestock and Pastoral Development

The Bureau Agriculture and Natural Resource Development is mandated for the overall coordination fodder production improvement programs including capacity building and input supply in the region, ensuring that there is synchronization of activities by the various supporting organizations. At regional level particularly in last two years, two parallel Bureaus have been established by splitting the existing Bureau of Livestock Crop and Rural Development in to Bureau of Agriculture and Natural Resource Development and Bureau of Livestock and Pastoral Development. The latter's mandate is to oversee the fodder marketing, utilization, distribution and coordination of response after the fodder is produced by relevant partners. During 2016/17 severe drought in the southern parts of the region LPDB in collaboration with the Federal Government has dispatched about **250,000 Bales of natural pasture hay** and distributed to 53 livestock feeding centers in Somali Region. This shows the low fodder production level of the region.

Generally, the partners operating in the region and wishing to provide any assistance to the agro-pastoral communities must liaise with the with these Government Bureaus in order to plan and

identify gaps. Both offices play a pivotal role in providing training and extension services to the grass root level teaching the community about the importance of fodder. Somali Region Pastoral and Agro pastoral Research Institute through its Gode and Fafan Centers undertook many activities and entailed the adoption of improved fodder types and intense extension educational campaigns through mothers and babies trails program since 2008.

The farmers also receive irrigation support (in the form of fuel, seeds etc). The Station has been buying all the harvested fodder seed and re-distributing to other farmers. The Research Stations has a program to introduce the Sudan and Panicum grasses, Alafalfa, Rhodes grass , Bufel and Labalab on a large scale through Community Based Seed multiplication process and using farmer research groups at Gode, Kelafo, Jarati , Doloado, Jijiga and Fafan research centers and sub centers.

UN Agencies, Local and international NGOs

The NGOs are mainly humanitarian organizations operating in Somali Regional Sate to provide humanitarian assistance and general disaster recovery to the pastoral and agro-pastoral communities living in the study areas. Among UN agencies working on the fodder sector particularly during the recent droughts of 2016/17 in southern zones of Somali region was FAO taking the lion share through dispatching over 130 Euro Trucks with trailers of feed such as Urea Molasses and Bagasse, MNB and ATMR. Other NGOs also include, SCI, VSF-Suisse, Mercy Corps, and Action against Hunger, OXFAM GB, PWO, OWDA, SCI, ACF (AAH), Mercy Corps, Islamic Relief (IR) and HCS. Some of the NGOs like VSF-Suisse have also supported cultivation of improved fodder in Shinile and other districts of Sitti zone where SCI and PWO have supported on similar issues in Erer district as well.

Although the figure of emergency livestock feed dispatched in 2014 -2016 to the Sitti and Fafan zone drought crises, the above stakeholders have supplied over 7,500 metric tons of livestock feed in 2016/17 drought crises of Somali Region (southern zones). The majority of the feed that constitute wheat bran, Sudan Grass hay, ATMR, MNB etc. has been purchased and dispatched from high land areas of the country and distributed to 53 livestock feeding center. This also indicates the low fodder production level of the region.

GIZ Assistance to the study area

In an attempt to bridge many of the gaps that exist in the study areas, GIZ has been implementing a number of farmer support programs in terms of capacity building to Gode TEVT through SDC support programme. The progarmme also supports pilot activities that focus on the soil and water conservation activities in the study districts. The outcomes of the GIZ pilot activities are believed to complement the fodder sector development in the study areas. During the study, Shinile and Erer district has mentioned that the revised action plan has been submitted to GIZ to start the planned activities in time. Moreover, in Harorays (Jijiga north) and Shabelay (Jijiga south) districts, the study team observed the actual activities supported by GIZ. In collaboration with the regional Agriculture and Natural Resource Development Bureau (ANRDB), Woreda Agriculture and Natural Resource Development Office (ANRDO) and the local community, GIZ is supporting the construction of **Water Spreading Weirs** in Amadle kebele of Shabelay district. The three Water Spreading Weir observed in Amadale have varies length and have the capacity to restore the eroded gullies to normal state thus rehabilitating about 30 Ha farm and pasture lands.

According to the beneficiaries, some of the gullies were nearly 3m deep and the now the land has been fully restored to the original state and the farmers are able to see pasture revival and crops were planted on the reclaimed land during the visit.

Source: Regional Agriculture and Natural Resource Development Bureau

Moreover, the study team observed the ongoing construction activities of one Hafier Dam at Lamadaga Kebele of Harorays district supported by GIZ –SDC the Resilience Building Progarmme. According to the communities, the Hafier Dam's dimension is 70m*50m*4.2m and has the volume/capacity of storing 14,700 Cubic Meter of water which can be used both for drinking and

irrigation as well. It was also mentioned that, more compaction will be made to the bed of the Hafier Dam and also installation of the necessary Geo-membrane is part of the plan

Generally, the Dam has good catchment area that can replenish the Dam during the rainy season. This intervention is also believed to narrow the gap and complement the fodder development sector in the District in the near future. Generally, the two above mentioned pilot activities can be taken as good practices from the resilience building point of view in Somali region and can be scaled up in to other parts of the region.

The Wabe Shabelle River, the Shinile Boreholes and the Erer surface water /streams

An estimated 3.6 Billion cubic meter of water flow through the Wabe Shebell River and drain down to the neighboring Somali every year. Along the Wabe Shabelle River a fertile alluvial deposit exist which can be used for fodder and other crop production as well. Unfortunately the Wabe Shabelle along Gode district does not have gravity irrigation schemes like that of West Gode (Berano district) upstream of Gode town and the farmers in Gode district only depend on water pumps to lift water from the River and irrigate crops every season. However, limited capacity of the pumps, lack of knowledge and skills to operate pumps, high operation cost of the existing pumps due to high fuel price in Gode areas (19-20 ETB/Lit), lack of improved fodder seeds lack of necessary planting materials, pesticides, high prices of pump spare parts and lack of community based trained water pup technicians are the key bottle necks hampering the progress of the fodder sector development. Environmental degradation is incrassating in an alarming rate along Wabe Shabelle River due to the deforestation of trees along the River bank by the local community. The negative impact of this problem is manifested during lifting water from the river by small pumps where the water is far from the pumps to lift water during dry season due to the widening midevening width of the River from time to time. The river embankment has been collapsed /eroded by the rainfall water (run off) and mostly there is no strong ground to place the irrigation pumps by the farmers. This scenario also makes the water pumps become vulnerable to floods during wet season.

In Shinile district the main water source for irrigating fodder crops and other food crops is from the Boreholes developed by the government. There was also sprinkler irrigation system which has been contracted for a company but the system has failed to function due to technical problems from the

contractor. Moreover, one of the big issues raised by the community during focus group discussions in Shinile district particularly in Harawe site was lack of water to irrigate crops despite the existence of many boreholes. The main cause of this problem is the Ethiopian Electric Corporation which is responsible for the electric power supply for the pumps. Due to this reason the fodder crops cultivated this year has wilted due to lack of water and despite many complain to the regional government the challenge still exist in the Harawe site. Regarding to Erer district , there was a complain of water scarcity by the farmer to irrigate their crops and the main factor for the water scarcity is the seasonality of the water coming down from the mountains to the farm lands which depends on only the rainfall in highland areas of Oromia Regional State. In one of the FGDs in Fadhuli and Qandaras Kebeles , they request hand dug wells and other water harvesting mechanism to store water and irrigate crops during water scarcity.

Lastly Harorays and Shabelay districts also have sever water shortage problems and the two districts depend on rainfall for fodder and other crop cultivation. In the FGD sessions the participants mentioned, construction of Hafier dams and water storage facilities will enable them to cultivate fodder crops to supplement the crops water needs. In one of the FGD in Shabelay district the participants suggested that hand dug wells can be used to irrigate fodder crops if they are assisted with necessary materials to dig the Hand Dug Well and also provided with small water pumps that lift the water from wells (5-6 m) deep particularly in Shabelay town areas.

The demand for fodder in Urban and Peri-urban settings of Gode district

The two major fodder types grown intensively in Gode study site is green maize fodder and the Sudan grass. The green maize fodder is used from existing local variety maize seed where as the Sudan grass need improved seed for proper performance. Without any further intervention the green maize fodder has became sustainable and it is one of the leading fodder type in Gode market today despite its lower nutrition status as compared to other improved fodder crops. Unlike the maize or sorghum green fodder, the Sudan grass is labor intensive, and requires good management from planting to harvesting. If the Sudan grass is used as green fodder and bailed for sell, the farmer has to purchase seed next season. Some of the key challenges associated with the maize fodder are outbreak of worms which attaches the entire leaves of the plant since 2017 and lack of insect pest

sides to tackle with the problem. In regards to the Sudan grass, the community does not have adequate information on management of the crop including on post harvest handing of the seeds and the hay making technical as well. There is no an agreed standard of box dimension when baling and the baling is not to the standard as well. Lack of market information on the feed, lack of seeds, lack of capacity of farmers and lack of fodder bank is the key issues to be considered in the sector. Moreover, due to land degradation as a result of population pressure in Gode areas, the existing range lands have been overgrazed. Many of the neighboring pastoralists have moved their livestock such as cattle, shoat and camel to Gode town. These households send their livestock to the range land during day time but provide supplementary feed of green maize and grinded maize grain to the lactating animal and they sell the milk in Gode market every day. A portion of the income is gain purchased with fodder and the remaining is used for household needs.

Some of the key issues that are currently encouraging farmers to produce green maize fodder on sustainable base is the existence of many lactating animals in Gode town, livestock owners readiness to buy the feed and expand from what they earn from the milk sell, and sometimes the livestock owner use the fodder as survival feed during critical drought time to save their livestock against the drought.

The Sudan grass has not been entered in to Gode market yet like the green maize or sorghum fodder because of the price variation between the maize and the Sudan grass fodder. Based on this, only the better of people are specialized to plant the Sudan grass as a commercial feed. The growers of the Sudan grass mostly produce the grass to sell to the NGOs or movement in order to get high return from the sale. Most of them sale the hay but few wait until the seed matures and sale the seeds later to NGOs and individuals. Therefore, existence of the NGOs in the area is one of the reasons which encourage the growers of the Sudan grass along the Wabe Shabale River.

Targeting women and youth. Looking at the membership of cooperatives, it can be estimated that 10-15% of the fodder producers particularly in Gode and Berano districts of Somali Regional state are women cooperatives. There are many youth who (seek to) establish themselves as fodder producers particularly in all areas along major Rivers. Sometimes they are entrepreneurial sons of improved fodder production, or producers that want to become a cooperatives union themselves.

To understand dynamics well and to plan for practical action, a gender and youth action research will be required. The focus will be on practical action, with induced better understanding of the specific challenges for female and young farmers.

Challenges of the commercial livestock feed/fodder producers in the study areas

Apart from the subsistence types of fodder produced by the local community (Agro-pastoralists) in the study areas, there are number of companies, enterprises, cooperatives, investors and individuals who are involved in the production of different types of fodder across the study areas.

Some of the companies, enterprises, cooperatives, individuals or investors include:

1. Wheat flour factories in Dire Dawa and Jijiga towns (Fire, Ummi and Hire in Dire Dawa and Liban which has six branches in Jijiga and Durdur wheat flour factories)
2. Multi-nutrient Blocks (MNB) producers cooperatives in Erer and Gode town (owned by
3. Sesame oil seed processing mill owners (constitute individually owned and cooperative owned –about three exist now) in Gode,
4. Activated Total Mixed Ration producer enterprise at Jijiga town (this enterprise produces ATMR and MNB)
5. Cooperatives who produce market oriented Sudan grass (this include about 50 youth groups and other local farmers cooperatives)

Regarding to the wheat flour factories, which mainly produce wheat bran as the main by product of the wheat flour, the byproduct consists of two types of wheat bran, the fine grain and coarse grain wheat bran where as the consumers suggest, the fine grain is better than the coarse one although there is no price difference between the two products. The main challenges with the production is shortage of raw materials particularly wheat. Because of this reason all the wheat factories idle during the survey time. The main cause of the problem reduced production of wheat in Awbare, Jijiga and Tuliguleed Wheat producing areas, low prices paid by the factory owner to the farmers which forced the farmers to keep their wheat at store until market improves and the changing of the relief wheat to cash transfer by WFP and government restricted regulation on movement of relief wheat from one district to other district are some of the key

challenges encountered with the Jigjiga factories. For Dire Dawa wheat factories as well, the shortage of wheat exists but the factories have linkage with Bale areas of Oromia for supplying limited wheat to the factories.

According to the wheat factories in Dire Dawa, all the nearby agro pastoralists are their customers and purchasing wheat bran and wheat middling takes place either as individual or as intermediate traders who further distribute to the consumers particularly to Erer Woreda where as in Shinile the consumer directly come and purchase wheat bran..Similarly, the Jijiga factory owner mentioned that despite the current scarcity of the raw materials they had many customers that come from various places across Fafan zone Woredas. The Dire Dawa factory owners mentioned that the problem of fodder contamination (such as Aflatoxin and related issues) are required and can be addressed by the concerned government bodies particularly contamination of wheat starts from the farmers producing wheat which also affects livestock latter on. The other issues mentioned by the wheat flour factories' owners in Dire Dawa were lack of linkage between the consumers and the factory.

The MNB producers in Erer Woreda - Himilo Livestock Feed Processing Cooperative was established by FAO and the Regional Livestock and Pastoralist Bureau during 2016 Sitti drought crises. The firm has currently three production machine with a daily output of 1000 pcs of MNB made of eight different ingredients (Molasses =34%, Wheat bran =28%, Nug/fagulo=18%, Water =5%, Salt= 5%, Cement=5%, Salin soil =5%) and takes two days to completely cure /dry. The other MNB machine in Gode is owned by a private investor and has not been installed yet. Himilo cooperative in Erer town has currently 20 employees. In the recent drought of Somali Region the cooperative has supplied about 10,000 pcs of MNB to drought affected areas of Jarar, Korahe, Dollo and Shabelle zones of Somali Region. Although the cooperatives frequently encounters market problem for the product. Team observed an agreement that the firm has with PWO to supply about 14,000 pcs MNB to be transported to Galhamer district of Dollo zone of Somali Region. Lastly, apart from the lack of access to credit facility, it was mentioned that transportation cost of Molasses which is highest ingredient to the product is very high. For instance the cost of Molasses for one time production is nearly 36,000 birr and it takes 40,000 birr to transport from Sugar factories to Erer town.

Owned by private individual, the livestock feed processing firm at Jijiga produces Concentrate (ATMR) and MNB with a daily output of 400 Quintals of concentrate per day and 2000 pcs of MNB. The first product has 18 ingredients and the later has 9 ingredients. Major costumers of the product are government offices particularly the Woredas that are currently involved in the government pilot project named BBC project (or water, Feed and Feed) that is being implemented in every Woredas of the region, Jijiga University for the animal production or research department and NGOs. The enterprise has currently 20 temporary employees and two permanent staffs and also recently expanded its operation span to reach Dagahbur and Dagahbur towns. It also began to supply to the neighboring Somali Land and has communicated with Djibouti to supply in the near future. The product is also aimed at fulfilling the dietary needs of livestock such as camel, cattle, shoat and poultry as well according to the feed formulation rule. The enterprise is also a training plat form to demonstrate for the students and trainees coming from various areas of the region. During the survey the consultant team observed that VSF-Suisse staffs were undertaking demonstration activities inside the firm to the trainees. Despite all this efforts, there was lack of market linkage that go with its daily output where the issue of raw material supply particularly wheat is the challenge to the firm as the wheat and Molasses is transported from highland areas with high transportation costs.

Sesame oil seed processing also exist in Gode areas. Traditionally since ancient time or back to the 16th century, Gode and its areas like Kelafo, Mustahil and Ferfer districts were known by producing sesame oil seeds (food oil) and processing was done by camels revolving on a wooden container filled with sesame seeds. Inside the container there is wooden grinder which is tied with the camel and as the camel rotates around container it grinds and squeezes the seeds where sesame seed oil is then produced and the by product called sesame oil seed cake (Mankaal) is also produced. Although this was very laborious and very difficult task both to the attendant and to the camel, technology has replaced the production system with grinding mill/machine of about the size of maize grinding mills. One quintal of sesame can yield 20 Liters of sesame oil, 25 Kg of Oils seed cake and 5 Kg of liquid sauce. The latter two are given to livestock as fodder; the oil seed cake by product is an important fodder for livestock.

Generally the sesame grinding mills are currently operational in the above mentioned districts. Moreover, the key challenge is under production of sesame crop itself due to lack of linkage to market, poor product and lack of processing improvement, lack of improved seeds etc. The government has established recently cooperatives with an initiative to stop the commercial edible oil coming from abroad and replace with the local one. After piloted with 2000 quintals of seeds, the production is terminated mainly because of the lack of raw materials coupled with the top down initiative approach employed although many people have liked and consumed the product during the piloting.

Lastly, production of sesame oil seed Cake was minimum this year in Gode because of the prolonged recurrent drought and farmers have not planted sesame during last Deyr 2017 season and price of one litter has increased from 250 birr to 350 a 40% increment. Similarly the price of sesame oil seed cake has also increased by 50% in Gode market. Because farmers have been busy with planting of Maize for livestock feed either for their own livestock or for sale as a result, sesame oil seed processing machines was idle for some time. However the current source of sesame oil seed cake as a fodder is from Kelafo district. According to the focus group discussion in Gode district, there is anticipated harvest between August and September in the project area which will slow down the current price of the oil as well as the seed cake.

Lastly the commercial Sudan grass producers have also emerged during recent El Nino and La Nina episodes in the Horn of Africa 2014-2017, when many cooperatives / individuals in Shabelle and Sitti zones realized the increasing demand for fodder in the region and the huge fodder coming from highland areas and decided to invest and produce irrigated Sudan grass to supply to Government and NGOs. Most of these cooperatives/individuals started the cultivation after the drought intensified and their harvest coincides with the rainy season. Due to this reason, they often suffer from lack of market. There are nearly 80 such cooperatives involved in production of Sudan Grass across the region with the main reason of fodder supply to the drought affected areas. Fifty of the them have been assisted by the government and the fodder has been purchased by the government recently. Another challenge is lack of improved seed, high cost of fuel, lack of awareness on bailing and lack of consistency and continuity of the production as the production

vanishes when the drought vanishes couple with lack of storage facilities and post harvesting skills and knowledge among the producers.

Environmental sanitation and invasive species problems in the study sites

In almost all the focus group discussions, the participants pointed out that , one of the major cause of sudden death of livestock during the recent El Nino and La Nina episode was livestock feeding on waste substance such as plastic bags of various types and size that is scattered and disposed everywhere in the environment such as villages, towns , streets, often trapped fences , shrubs and garbage areas. These items include, plastic package of different commercial goods, such as pasta , candy, clothes etc used for packaging different foods and stuff and when consumed by the animals, the waste items affect the small intestine of the animals and hence causes sudden death of the animals. The situation was severe in all the study sites.

Moreover, the issue of the invasive species particularly, Prosopis Joliflora (locally named Ali Garoob or Geed Yuhuud) is spreading in an alarming rate in some of the study sites. The most affected areas include Shinile and Erer districts where the species has occupied all the existing farm lands and pasture lands as well. In Gode study sites as well, the study team observed the advancing of young Prosopis trees to the farm lands in Badila'ad and Kunka Kebeles (or study sites). In one of the Focus Group Discussion in Shabelay district it was also mentioned, Cactus plant (Tiin in local language) between Shabelay and Hadaw towns is creating a serious threat to the livestock.

In the past, many people used to believe that Cactus was helpful in supporting livestock particularly camel in coping with drought stress. Unfortunately the community argues, the existing of Cactus plant has the capacity to kill animals particularly the tiny thorns in the outer part of the Cactus leaves and/or fruits are responsible for the death of sheep and goats where in cattle it causes dysentery problem and often cuts the tongue of consuming animals. Effects on goat and sheep also include blindness, skin diseases, and mouth bleeding, broken teeth where its negative impact on livestock has been increasing since the last five years. Although the cactus observed in Shabeley district was the wild type, this issue will pose question on the previous understanding of cactus plant as fodder for camel unless its effect is carefully examined by feed experts or the appropriate variety is chosen

as friendly fodder type. Another invasive species is also locally called '' Bakarkate'is causing deadly illness followed by death in camels particularly when consumed by adult camels.

Key notes on the consultative meetings in the study sites

Stakeholders met in Erer District

The following points were the key challenges raised by the participants on the production of fodder in Erer Woreda :

- Lack of water for crops
- Scarcity of improved fodder seeds
- Lack of access to market – no livestock and forage market center the nearest livestock market is Bike (this also affects fodder market since livestock traders are far from Erer)
- Scarcity of technical staff on fodder production and management
- lack of transport facilities for DAs and extension workers
- The Education office also suggested that the scarcity of fodder often triggers high student drop outs due to movement of families with their livestock in search of pasture
- Similarly, the head of Woreda health office has mentioned that malnutrition and fodder scarcity has directly related in the Woreda
- Woreda DPPD also recommended excavation of boreholes or other water harvesting mechanisms including spring water source diversion and harvest for irrigation- such as Spate irrigation.

Key notes from Shinile District consultative meeting

- Weak Institutional capacity – a need for capacity building
- Lack of awareness on fodder cultivation and marketing
- No cooperatives established for forage production and lack of market chain
- The Woreda is currently implementing the government BBC initiative (Water, Food and Feed) to support 20 HHs on 40 hector

Key notes from the Gode Poly Technique College

Some of the forage crops experimented in the college are

- **Legume:**
  - ✓ Alfaalfa
  - ✓ Caw pea
  - ✓ Lablab

- **Grass Species**
  - ✓ Elephant grass
  - ✓ Sudan grass
  - ✓ Panicum
  - ✓ Rhodes
  - ✓ Bufle grass

Concentrate Feed Mixed

There is also a concentrated feed mixed handled by the college and SCI office jointly - it produces feed for poultry, animal feed and diary – the feed product is sold to livestock cooperatives. The factory is initially allocated to hand over cooperatives graduated from the collage and yet this plan is on process.

Key notes from the Consultative meeting with NGOs in Gode involved on fodder support

Catholic Relief, ADRA and SCF are the most known organizations – Catholic and ADRA used to provide to the farmers – farm inputs such as seed and fuel to produce maize as fodder in Dudade Kebele and Baare, whereas SCI interventions are as follows:

Two types of concentrate feed:

- ATMR – which is high quality feed for the lactating animals and
- Wheat Bran (Bunshe) distributed around 1734 Quintal Targeted beneficiaries -900 HHs Source of the wheat bran was out of Gode –Even though wheat or flour processing factory exists in the past it has not been functional for long time due to lack of raw material.

Key Notes from the consultative meeting with SoRPARI

Somali Region Pastoral and Agro pastoral Research institute SoRPARI pointed out that so far the fodder crops adapted in Somali Regional states agro ecology constitute the following improved forage varieties:- Sudan grass, Alfaalfa, Rodhus, Panicum maximum, panicumanidotal Elephant grass Buffle grass, Lablab Cow pea small and cow pea large

Out of many forage species introduced to the famers in Somali Region have adopted only the Sudan Grass despite the existence of more nutritious forage species i.e. as compared to Sudan Grass.

This is because:

- Sudan grass is familiar in terms of growth character to sorghum
- Easier management whereas Rodus, panicum, panicum maximum and buffle grass is difficult to manage by farmers and hard especially at initial establishment

- Unlike Sudan grass large area use to yield small amount of seed and difficult to manage seed hence seed is expensive

Seed Multiplication Sites

- **West Gode 250 Ha** is planned to plant from this plan 140 Ha was put in to practice and/or planted so far
- **Golaajo – 50 ha** forage such as Alfaalfa Elephant grass Rodhus, Panicum and Lablab
- **Kelafo 50 Ha:** was originally aimed at establishing cattle production sites and seed multiplication site as well whereas production of improved feed for cattle production in terms of milk and meat productivity was also in the project plan.

Gol-Ajo Production Site- planned to Establish Camel production site and 10 Ha. of Rodhus ,Sudan and Elephant grasses have been produced so far.

Major Challenges

- Budget scarcity
- Manpower – there had been staff turn over
- There had been seed availability problem to the farmers although this problem has declined now.

5.9 Discussion

Selecting a representative product for analysis

In the study area, a number of fodders based economic activities take place, such as cultivation of maize or sorghum green fodder or residue, Sudan grass, use of the sesame by product as a fodder and use of cereal garins as a fodder during drought time as well. As mentioned in the preceding sections, the community also deaths with drought stress by purchasing different types of feed from the nearby towns. These types of feed are produced by wheat flour factories in Jijiga (Liban and DX, and Durdur) and Dire Dawa (Fire, Hire and Ummi flour factories) towns, Himilo Cooperatives in Erer town also produce Multi-Nutrient Blocks (MNB), one enterprise in Jigjiga town also produce ATMR and MNB and finally several sesame oil processing mils in Gode produce sesame oil cake as by product and supply to the market. However, due to time and resource considerations, one representative fodder type needs to be selected for in-depth evaluation. In this section, the rationale for the selection of a representative product is explained. Data collated from the study Kebeles and on production levels, on the volumes of consumption and sales are used to provide a brief overview

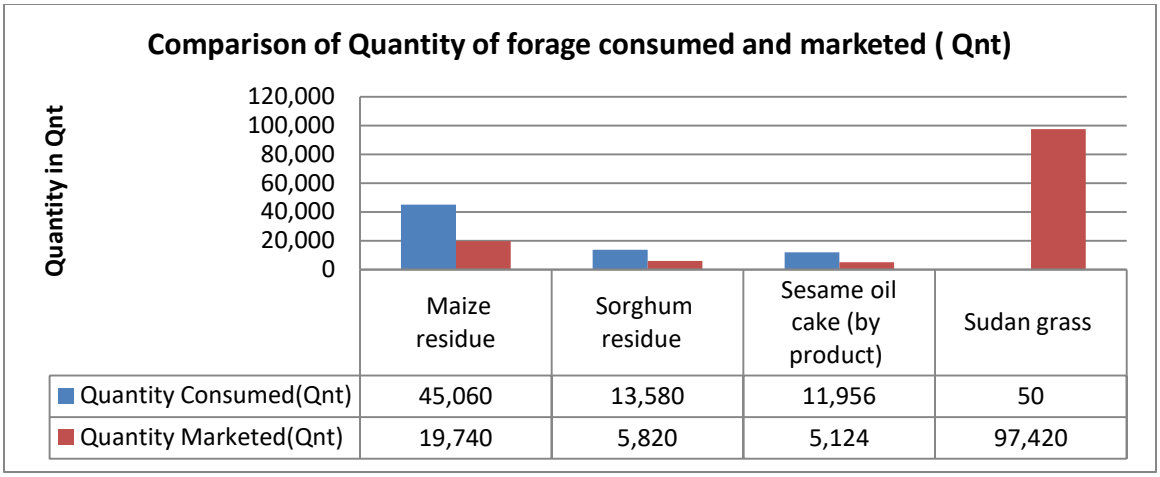
of the structure of the fodder sector, with a view to allowing a comparison of individual fodder products.

Taking the Gode study site as an example, normally the major primary feed resource used by the residents in the study area is natural grazing lands. Available information also indicates high potential for conserving excess fodder during the wet season from these lands. However due to protracted dry season, rural people and dairy producers in urban and peri-urban areas of Gode town are becoming more and more reliant on secondary feed sources such as crop residues and feeding green maize stacks. The practice of cutting immature maize plants at its 45 days of growing period for the purpose of feeding own livestock and for marketing is being widely practiced by the farmers in irrigated along the major Rivers. Forage production in the study Kebeles is estimated based on residue and by product of three major crops (maize, sorghum, sesame) that cover 62% of the total cultivated land in the assessed Kebeles of Gode district. For irrigated farm lands, forage is harvested in two cycles while a single season is considered for rain fed farms. Existing information indicates that over 2/3rd of the forage production is used to feed livestock owned by the family.

Table 5: Fodder production, home consumption and sales (qnt)

Source of forage	Hectare	Yield q/ha	Total production (qnt)	Consumed (qnt)	Marketed (qnt)
Maize residue	354	100	65,800	45,060	19,740
Sorghum residue	194	100	19,400	13,580	5,820
Sesame oil cake (by product)	244	35	17,080	11,956	5,124
Sudan Grass	95	342	97,470	50	97,420
Total	887	577	199,750	70,646	128,104

Source: Gode district Agriculture and Natural Resource Development office, 2018



Ranking of fodder types

The data described in the previous sections formed the main information source for identifying a product that is representative of agro-ecologies, livelihood zones and different categories of agricultural products in the study area. Based on its relevance to this particular study, some of the following selection criteria have been considered.

1. Unmet market demand,
2. Potential Increase in rural incomes,
3. Potential for employment generation,
4. Government or donor interest.

In this ranking tool, three specific sub-criteria are defined under each of the above leading criteria to facilitate comparison of the forage products and select one representative product for further evaluation. Since not all leading criteria are of equal importance, they are assigned weights: 3 for No1, 3 for No2 and 1 for No2 and No4.

The sub-criteria items are then scored on a scale of 1 – 5, that score is multiplied by the weight for the leading criteria and the columns are added together to reveal the total points scored by each product. Finally, the crops are ranked from first to 4th on the basis of scored points and the one with highest will undergo further evaluation along the line of its value chain. Table 6 bellow provides the ranking of individual products and the detailed scorings each received against the items in the criteria. Accordingly, out of 4 potential products maize has scored the highest (76) and ranked first, followed by improved forage production, sesame and sorghum.

Table 6: Detailed ranking of products

S/No	Ranking	Maize	Sesame	Improved fodder verities (Sudan Grass)	Sorghum
1	**Demand [weighted 3x]**	21	15	27	15
	Local/Woreda& kebeles demand	3*5=15	3*3=9	3*4=12	3*3=9
	National/Regional & Zonal demand	3*1=3	3*1=3	3*3=9	3*1=3
	International demand	3*1=3	3*1=3	3*2=6	3*1=3
2	**Income generation [weighted 2x]**	30	22	14	18
	Poor households	2*5=10	2*3=6	2*3=6	2*2=4
	Gender women	2*5=10	2*3=6	2*1=2	2*3=6
	Capital required	2*5=10	2*5=10	2*3=6	2*4=8
3	**Employment generation [weighted 1x]**	10	5	9	6
	Poor households	1*4=4	1*2=2	1*2=2	1*3=3
	Gender	1*5=5	1*2=2	1*2=2	1*2=2
	Small scale industries	1*1=1	1*1=1	1*5=5	1*1=1
4	**Government or Donor Interest [weighted 1x]**	15	11	11	7
	Government /donor	1*5=5	1*1=1	1*2=2	1*3=3
	Environment impact	1*5=5	1*5=5	1*4=4	1*2=2
	Governance level	1*5=5	1*5=5	1*5=5	1*2=2
	Total	76	53	61	46
	Rank	1	3	2	4

Source: VCA result, 2018

In addition, a range of considerations were used to validate the fodder selected. Some of the additional justifications for the selection of maize are the following:

- Maize is a product currently grown in both agro-ecologies in substantial quantities and can be used both as food for human being and fodder for livestock either as grain fodder, residue or green fodder. It is flexible and can be switched to different products that suit the prevailing circumstances.
- Maize is currently the major crop grown by all farmers in all agro pastoral areas and covers close to one-third of the total land under crop production, which is higher than all other crops.
- Being a staple food widely consumed in the area, enhanced production of maize would have significant contribution to alleviate food security for the beneficiaries and the community. It also provides added advantage in terms of livestock forage and milk production. It is also in line with

the government policy promoting food production as one of the strategies of ensuring food security in drought prone areas.

- Maize has the opportunity to exploit the supply gap in the region both in terms of grain and fodder which currently stands at 31% and expected to reach 42% in five years in terms of grain. On the other hand, substantial volume of maize in Gode market and Jijiga(around 41% and 15% respectively) is currently supplied from other districts, indicating both a potential for increased production and the existence of inefficiencies in production system.
- Through years of practice, the farmers have acquired a fair level of knowledge and skill to manage inputs and outputs by themselves with limited external support.
- The potential to boost maize production is significant. As high as 30% increase of yield could be attained by just switching from use of the traditional seed variety to improved seed variety. While the rest of the crops, particularly the Sudan grass and sesame, have limited opportunity as they are already based on improved seeds the use of maize as a green fodder is increasing in an alarming rate in various parts of the Horn of Africa.

5.9.1 Proposed options for future studies

However, selection of maize for the value chain analysis has to be considered only as an entry point and should not be taken to mean other products do not need the same study. This study proposes product options for future value chain studies for groups of products which utilize similar production systems and packaging, and tending requirements. Table 5 below provides prioritized options that more or less reflect the outcomes of the ranking process discussed above. The arrangement of the specific products within groups also shows product priority implying that if it would be required to base a study on a single product which has a capacity to represent all other members in the group then the first product gets the priority.

Table 7: Proposed priorities for value chain studies

No	Product grouping	Products in the groups	Priority
1.	Maize fodder	1.Green maize Stover , 2. Maize residue , 3.maize grain as fodder	1st
2.	Improved Forage production	.1Sudan grass, Rhodes grass, Bufel, Alfalfa, Napier etc	2nd
3.	Sesame	1.Sesame oil seed cake	3rd
4.	Sorghum fodder	2.Sorghum residue, Sorghum green Stover, sorghum grain fodder	4th

Source: VCA result, 2018

5.9.2 Value chain analysis of maize grain and green Stover (compared)

Background

Maize is a crop that is widely grown thought the country. It is grown by small-scale subsistence farmers, private commercial farmers and state farms as small holders' plant maize mainly as a subsistence crop while the large modern farms mainly produce for the market. According to CSA data, the average area planted under maize during 2008/09- 2010/11 main (MEHER) season was about 1,963,180 hectares, accounting for about 21.7% of the total area planted under cereals. Similarly, maize production during the same period averaged some 49,861,254.9 quintals or 31% of total cereal production. The share of the smallholder sector was about 95% of total maize production.

Per capita maize consumption in rural Ethiopia is significant-about 57.9 kg- and this accounts for nearly 31.5% of total rural cereal consumption. However, the per capita consumption of maize in urban areas is low-16.1 kg-which is only 13.6% of total urban cereal demand. The major cereals consumed in urban Ethiopia are Teff and wheat which account for about 53.2% and 17.8% of total urban cereal demand, respectively.

5.9.3 Supply and demand of maize at Gode market

Gode town grain market is the major market outlet and trading center in the area for a wide range of agricultural products including maize. There are 11 grain wholesalers in the town who are engaged in buying and selling of maize. The wholesalers receive their supplies from individual farmers as well as rural collectors and sell to individual consumers as well as traders who retail maize in the open market. According to discussions with grain sellers and interviewed key informants, Gode market gets its maize supply from farmers and collectors within and outside of the Gode Woreda, including Kelafo, Adadle, East Emey and West Emey (Jiq Kebele) Woredas. Farmers of the study Kebeles also sale their agricultural products in Gode Market.

However, systematically recorded data or previous study report is not available to evaluate the demand and supply trend of maize or other crops traded in Gode market. Consequently, interview of grain wholesalers has been used to estimate current volume of maize supplied to Gode market. Accordingly, the estimated supply of maize to Gode market is around 23,760quintals.

On the other hand, market demand for maize is estimated based on population projection and per capita maize demand. Per capita demands of 57.9 kg and 16.1 kg has been considered respectively for rural and urban residents of Gode woreda, and it was further assumed that 50% of the rural population of the woreda get their maize supply from Gode market. Adding the urban and rural demand, the estimated market demand in 2018 becomes around 34,419 quintals.

Table 6 presents projected demand and supply figures over the next 5 years, assuming maize supply and per capita maize consumptions to remain unchanged. The projections suggest a significant opportunity for study area farmers to expand maize production.

Table 8: Projected market demand and supply of maize in Gode market (qnt) in terms of grain

Year	Demand	Supply	Supply gap
Current year (2017)	34,419	23,760	10,659
2018	35,618	23,760	11,858
2019	36,861	23,760	13,101
2020	38,153	23,760	14,393
2021	39,493	23,760	15,733
2022	40,884	23,760	17,124

Source: VCA result, 2018

Figure 5: Comparison of maize Demand, Supply and Gap for different years

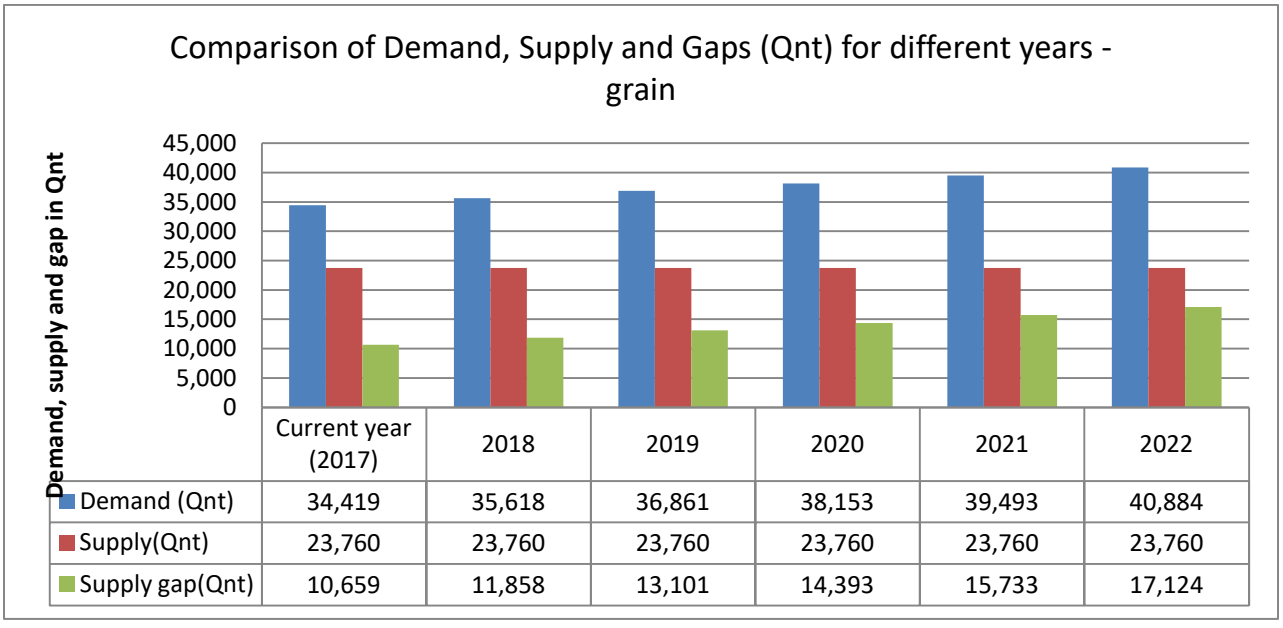
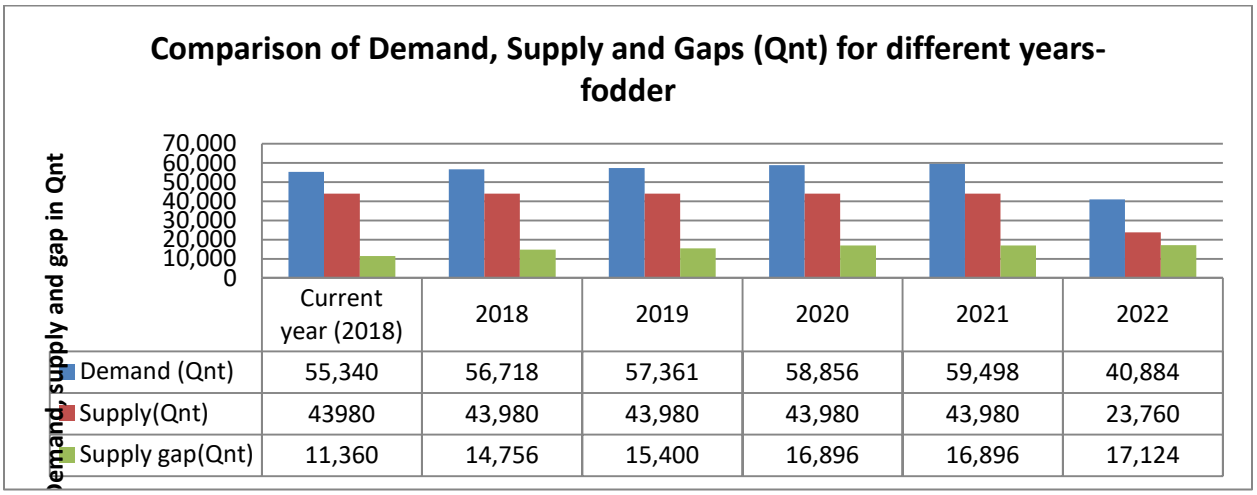


Table 9: Projected market demand and supply of maize in Gode market (qnt) in terms of fodder

Year	Demand	Supply	Supply gap
Current year (2018)	55,340	43980	11,360
2018	56,718	43,980	14,756
2019	57,361	43,980	15,400
2020	58,856	43,980	16,896
2021	59,498	43,980	16,896
2022	61,987	43,960	20,049

Source: VCA result, 2018

Figure 6: Comparison of demand, supply and gap of maize fodder in different years



Maize production and proportion supplied to market from the study kebeles

Maize is the most widely cultivated crop by the study area particularly by farmers in Kunka and Badila'ad Kebelles, covering 354 hectare of land which accounts 27.3% of total irrigated land. The variety of maize produced is a local breed known as "Kelafo" and its productivity, based on farmer's information, is 30 quintals per hectare, and farmers produce maize twice in a year by using irrigation water from the Wabe Shebele River. On the basis of the above information, it is estimated that the total maize production in the current year to be 18,240 quintals.

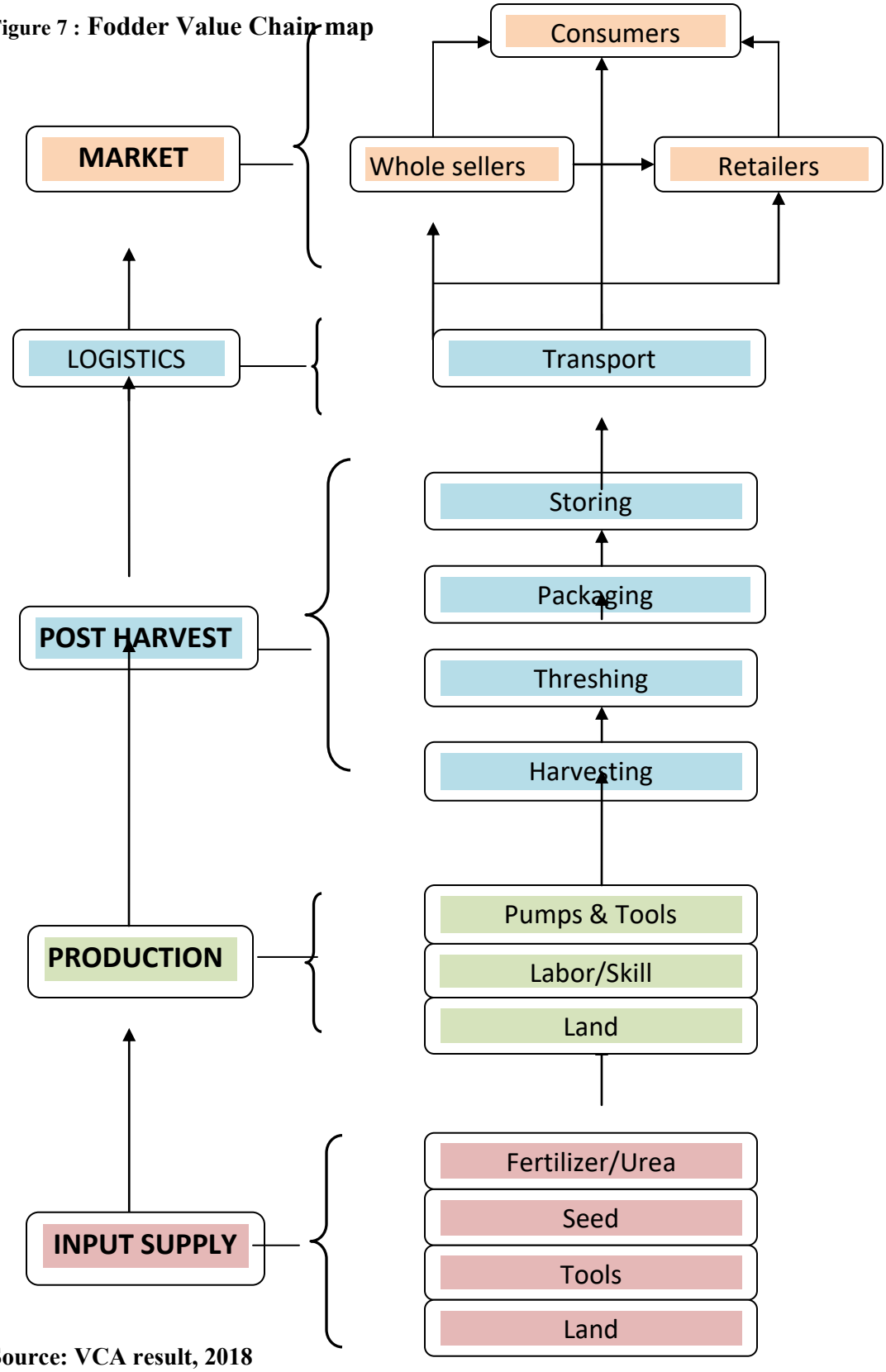
It is generally assumed that of the total annual smallholder production of maize in Ethiopia, about 83% is available for consumption while the remaining 17% is allotted for seed and feed. Nevertheless, in the case of the area under consideration, based on discussions with the study area farmers, approximately 50% of their produce is used for consumption at home and retained for seed and the remainder 50% is marketed. Calculations based on the above information shows that the

study Kebeles' farmers supply around 9,720 quintals of maize; covering 41% of the total maize supplied to Gode market.

Fodder value chain map

To understand the relationship of the value chains to the broader market it is important to know the various actors and the direct and indirect influence that they have on chain performance. The following map provides the current structure of fodder value chain in the case of maize which yields green fodder, grain and/ or maize residue as fodder.

Figure 7 : Fodder Value Chain map



Source: VCA result, 2018

The value chain map has been structured into a series of activities leading from production to eventual distribution into the market. The steps in the value chain are numbered, breaking the value chain map into logical process groups. Each one of these numbers therefore classifies the activity according to a specific type of task and is structured as detailed in Table 8.

Table 10: Value Chain Steps

S/No	Value Chain Step Definition
1	Input Supply
2	Farm production(methodologies including technical expertise)
3	Post-harvest activities
4	Transport
5	Marketing

Source: VCA result, 2018

Gross margin data for maize

The gross margin calculations are based on the traditional maize variety currently cultivated through irrigated farming on 304 hectares, constituting for 30% of the total land currently under irrigation, which is 1,036 hectares. A gross analysis is presented as a basis for estimating the relative loss in value to the chain resulting from identified constraints at each stage in the chain.

In calculating the gross margin, the following basic assumptions have been made where grain and residue is produced in the first example and the green fodder is considered in the second calculation as indicated in the table 8 and 9 below.

- All maize production is considered as if it were marketed, although it is known from farmer interviews that about half is utilized for home consumption and for seed. The reason for this is to recognize the financial value of household consumption whether it is produced or purchased.
- Average productivity of maize per hectare is assumed 30 quintals based on actual output in the area and two cropping seasons are assumed.
- Selling price of maize typically varies in a range from 400 to 500 birr per 100kg in Gode market depending on availability, as per data obtained from farmers and crosschecked at grain market. Average price 450 birr is used to compute gross income.

- Investment cost on pumps and agricultural tools is not considered due to absence of reliable data. As a way of compensation to the investment cost, revenue from sales of residue is also left out.

- An important, relatively recent marketing scenario that needs to be discussed at this point concerns a growing practice of cutting and selling maize plants for livestock fodder before they become productive. Farmers interview suggest that, this practice accounts for 20% of total maize population, where half is fed to own livestock and the other half is sold to Gode market. Shortage of grazing due to prolonged dry season in the study zone has prompted many farmers and dairy producers to use maize plant as alternative feed source for their livestock. Two month old maize trees, after the 3rd irrigation, are cut and sold to retailers in Gode at a price of 1 birr for 3 plants and 1 birr for 2 plants during normal and drought period respectively; the price however shows extreme variations depending on supply.

  The farmers use this cut-and-sell practice as a source of quick cash, but preliminary calculations suggest significant financial benefit over sales finished product. However full understanding of its financial and economic impact needs detailed farm based investigation.
  For the purpose of gross margin, in addition to the above discussion, considering the short-lived nature of the practice that will shrink when the rain comes, and also understanding the practice lacks official support, its impacts on income and production require close attention.

- Regarding production costs, the basic assumptions used as a basis for calculations, including costs of inputs, labor cost, pump operation and maintenance costs, and transportation cost are presented in Table 10 for food and residue production and on table 11 for green fodder production only for comparison..
  For transportation cost, cost of fertilizer and seed transportation for instance from Gode to farm, and cost or transporting 10% of total production to Gode is considered at a rate of 60 birr per quintal.
- Labor intensive farm activities identified were land preparation, planting, irrigating (4 times), weeding, harvesting and threshing. Calculation of labor costs for these activities was based on the per hectare expense obtained from farmers, rather than daily rate of manpower. The

rationale behind is the fact that farm labor in project area is supplied by the farmers themselves in the form of social labor locally known as "Goob" where a group of farmers assist one another in turns without the involvement of cash payment except provision of daily subsistence needs such as food and tea.

- It is to be noted that costs of sacks (15 birr/50kg sack) is omitted as it is usually paid for by the grain wholesalers i.e. in the case of grain production.
- Finally, a 10% contingency is assumed to account for various miscellaneous expenses both for grain production and for green fodder production as well.

The results of the gross margin analysis indicate that under the above specified assumptions, a gross margin of 1,961,208 birr was generated in one year over two cropping seasons on 304 hectares of maize farm when both the grain and residue is produced and marketed. On the other hand for the production of green maize fodder the results of the gross margin analysis indicate that under the above specified assumptions, a gross margin of 3,971,341.80 birr was generated in one year or two fodder production seasons.

Table 11: Gross margin of maize production (for grain and residue production)

Description	Gross margin
Farm land (Ha)	304
Cropping seasons	2
productivity(qnt/ha)	30
Average selling price (Birr/100kg)	450
UREA (kg/ha)	100
Income (Birr)	
Production (qnt)	18,240
Revenue from maize sales	8,208,000
Revenue from residue sales (10%)	820,800
Total income (Birr)	9,028,800
Production and sales costs (birr)	
Seed	182,400
Fertilizer	1,094,400
Land preparation	486,400
Planting	486,400
watering/4-times	1,459,200
Weeding	608,000
Harvesting	547,200
Threshing	608,000
fuel for pump	547,200
lubricant for pump	145,920
pump maintenance	108,571

Transport	151,392
sub-total	6,425,083
Other costs (10%)	642,508
Total cost	7,067,592
Gross profit	1,961,208

Source: VCA result, 2018

Table 12: Gross margin of maize production (for green fodder production only)

Description	Gross margin
Farm land (Ha)	304
Cropping seasons	2
Productivity of green fodder – 30 Donkey carts	25
Average selling price (Birr/donkey cart at farm gate	600
UREA (kg/ha)	100
Income (Birr)	
Production (donkey cart) (Average)	15,200
Revenue from green fodder sales	9,120,000
Total income (Birr)	9,120,000
Production and sales costs (birr)	
Seed	182,400
Fertilizer	1,094,400
Land preparation	486,400
Planting	486,400
watering/2-times	729,600
Weeding	608,000
Harvesting	447,200
fuel for pump	347,200
lubricant for pump	75,000
pump maintenance	72,600
Transport	151,392
sub-total	4,680,592
Other costs (10%)	468,059.20
Total cost	5,148,651.2
Gross profit	3,971,341.80

Source: VCA result, 2018

Evaluation of the Maize Value Chain

Using the value chain map, a series of constraints to chain performance have been identified for maize. The constraints associated with each chain are discussed in turn and an attempt is made to quantify, on the basis of the gross margin analysis, the value lost due to the constraints.

Chain 1: Input Supply

Unlike the practice in most parts of the country, supply of improved seeds and fertilizers in the study area is not done through the typical channels of district agricultural office or extension offices. Farmer cooperatives also play no role regarding the facilitation of input supply.

Instead, most of these inputs are supplied by the private traders in Gode town, who bring in the inputs from Addis Ababa to distribute to the local users, including the irrigation farmers under this study. However, the private sector does not supply improved maize seed and improved forage seeds as well.

Seed supply

For instance, types of improved vegetable seeds supplied by the private distributors include onion, tomato, carrot and green pepper seeds among others, while the commonly used seed types by the irrigation farmers are: improved variety of Hadramot onion seed and tomato local variety seed locally known as Yanyo-midholay. The farmers have confirmed that there is no shortage of these inputs in the market. However, except Sudan grass which even some times vanishes, the improved seeds for other fodder types are not available in the markets of the study area.

Regarding improved seed of maize, “Melkasa 2” is the among a range of Melkasa varieties (Melkasa 1, 2,3 & 4) released by the regional pastoral and Agro-pastoral Research Institute (SoRPARI) as per one of the reports 51.3 quintals per hectare was obtained. Based on key informants, the results obtained in the few instances where Melkasa -2 was donated by Agriculture office or some NGOs were very satisfactory, with reported per hectare productivity that range between 35 and 45 quintals in Gode area. Although the farmers are aware of its potential, the improved variety has not been made available for the kebeles under study on regular basis. Since there is no way in which the farmers could access improves maize seed, they are planting a traditional maize variety called “Kelafo” in Gode area and the long cycle one in Harorays, Shabelay, Erer and Shinile districts with

average productivity of 15-30 quintals of grain per hectare, which is significantly below the yield capacity of Melkasa.

Three scenarios in which the farmers get their supply of local maize seed have been identified:

a) ***Retention:*** during ample production season farmers normally save a certain portion of their production as seed for the next season
b) ***Market:*** usually following a bad harvest season, the farmers have to purchase seed from the market
c) ***Borrowing:*** it is customary to borrow maize seed from better off farmers in the community.

The farmers have informed the study team that mostly there is no shortage of local variety maize seed in the market.

From the food /grain perspective, the average annual loss of income by the maize farmer over 304 hectare resulting from using the comparatively less productive variety or due to not using Melkasa variety seed is calculated as follows. Assuming the yield capacity of Melkasa-2 to be 40 per hectare, the farmers could have produced 24,320 quintals of maize in the two cropping seasons, an amount 33.3% more than current production, which is 18,240 quintals.

Information obtained from key informant shows that Melkasa-2 maize variety is sold at much higher price than the traditional variety. Considering this added advantage and also accounting for the higher seed cost of Melkasa-2 maize variety, the estimated collective loss to the maize value chain resulting from not using improved seed is 6,384,000 birr per annum, which is equivalent to 21,000 birr per hectare.

Chemical inputs supply

The typical chemical inputs used by the farmers are fertilizer/UREA and various pesticide products. As per the farmer's information, there is no shortage of these inputs in the market. While Urea fertilizer is applied on all types of crops including maize, use of herbicides has not been reported by any of the farmers during the survey.

The farmers have reported that they are not using pesticides or pesticide on maize and other crops production as well whereas various types of pesticides are utilized for onion and tomato. Included among the list of pesticide products used are Agro-night, Deltrine, New star, Concur and DDT. Most of the chemicals are applied on onions which are highly attacked by a pest known as onion lice,

followed by tomato. Encouraged by its cheap price and its effectiveness in killing onion lice and locusts, the farmers also use the banned chemical DDT.

Information from the local farmers reveled that illegal use of hazardous chemicals is exposing the local communities to human and animal health risks. So far the death of a young boy in the study area is attributed to exposure to DDT. Farmers in near the study area shared their observation that livestock grazing on onion fields after harvest usually show signs of illness.

It was also observed that cultural pest control methods are commonly practiced by the farmers. These include sprinkling Holy water on farmlands to increase crop productivity and travelling long distances to hang a paper on which prayer scripts are written on a tree used by birds for breeding, believing that it will prevent the birds from coming to the farms and harming their crops.

5.9.4 Chain 2: Production

Water pumps and farm tools

Pump operation was one of the prominent issues raised during the discussions with irrigation farmers. The discussion regarding this input was largely centered on of pump maintenance. Currently 59 water pumps of different brands and capacities are in use by the farmers to abstract water from Shebelle River in the visited area alone. Available pump brands include Caprari/ Italian brand (4 Cylinder), CHANKFA/Chinese brand (1 cylinder) and Indian made Anil and Arrow brands (1 Cylinder).

Based on farmer's information, Caprari pumps were introduced to them about five years ago, on credit basis, through development cooperation initiative between the regions of Somali and Oromia. Other pump brands are purchased by the farmers themselves from suppliers in Gode town. Currently there are around five private water pump and spare parts suppliers in Gode town. The type and status of existing water pumps are summarized in the following table:

Table 13: Availability and status of water pumps in two sites that use pump method

Type of pump	Badila'ad	Kunka	Total	Non-functional
Caprari/ Italian brand (4 Cylinder)	14	14	28	2
CHANKFA/Chinese (1 cylinder)	5	8	13	4
Anil/ Indian (1 Cylinder)	4	6	12	5
Arrow/Indian (1 Cylinder)	2	3	5	4
Other brands	-	1	1	0
Total	25	32	59	15

Source: Gode district Agriculture office

As presented in the above table, over a quarter of the pumps (26.3%) were out of work during the field assessment due to maintenance related issues. Based on farmer's information, the problems are summarized as follows:

- ***Lack of spare parts:*** Spare parts availability is a major constraint emphasized by the farmers. Particularly, parts of Caprari pumps are hard to find as these are not supplied by spare part stores in Gode town. Sometimes individuals have to search for the components in Addis Ababa. At the time when the pumps were delivered, the associated spare parts such as dynamo, belts, foot valves, etc were not submitted with them. Foot valve collapse has been mentioned as the most common of pump maintenance problems.
- ***Farmers lack maintenance skill:*** No member of the farming community ever received trainings on routine pump maintenance, hence forcing the farmers to depend on the pump technicians from Gode town, even for the simplest technical problem encountered.
- ***Inadequate technician availability:*** The number of pump technicians in Gode town is not more than a handful and some of them are incompetent and untrustworthy.

Pump failure at a critical stage of plant growth that is before the 4th and final irrigation in the second month could rust in a complete failure of maize production. Assuming the forage value at 25% of the crop value, the potential loss of income to the value chain is 6,156,000 birr.

Farmers' knowhow

Repeated crop failures that resulted from using improper maize and Sudan grass seeds purchased from the market, improper use of hazardous chemicals such as DDT and widespread reliance on traditional pest control mechanisms demonstrate the existence of significant knowhow gap among the irrigation farmers. The situation is understandable considering the poor level of extension support being rendered to the farmers and lack of Farmers training centers.

5.9.5 Related issues raised by FGDs

(1) Growing pump maintenance cost mainly caused by the untrustworthiness of the pump technicians. When farmer call upon a technician to his village, he is expected to cover a number of additional expenses on top of pump maintenance cost. These include transportation cost of the technician (back and forth), provision of food, tea and coffee, chat and tobacco, as well as mobile cards.

The farmers also expressed strong suspicion that the technicians conspire with spare part suppliers to inflate prices of spare parts they recommend during maintenance.

(2) Escalating fuel and lubricant costs,

(3) Poor performance of extension agents and lack of FTCs.

(4) Increasing trend in hardening of farm lands after harvests has been an issue for the farmers. Some kind of scientific investigation might be needed to identify the root cause of the problem at the earliest stage.

(5) The need to replace the weak traditional water distribution structures by modern structures as well as the challenge of constructing irrigation canals over gullies have been raised by the farmers.

5.9.6 Chain 3: Post Harvest Treatment

Crop harvesting

The harvesting method of all crops including maize is based on manual collection of mature products by moving inside the farms, while the maize threshing is done by using a traditional technique known as '' Shuqlid'' it involves filing the maize ear in to a metal Barrel and trashing with

sticks unlike hitting with sticks on the ground in other part of the country then the threshed gain will be poured on a plastic sheet near the threshing site.

According to a study by Boxwall,Robin(1998), harvesting and threshing losses for maize in Ethiopia account for 2% and 4% of total production respectively. This equates to 492,480 birr per year (Collective income increased by 6% yield).[7] However, poor harvesting of grains manifest poor management of the fodder as well. Particularly in Gode area, the fodder harvesting and management is very poor as farmers do not cut the residue and collect where as they simply allow the livestock to graze inside the farm after the corn/ear have been collected.

Activities to either ensure that the calculated 6% is maintained or improved on would require critical evaluation of current harvesting and threshing systems and tools related to crop damage, searching for appropriate technology and trainings.

Packing

Packaging comes into the equation for the farmer, in terms of storage, transport as well as marketing. Added reason that makes packing so important is its contribution to reduced crop loss and in terms of preserving product quality.

Just after threshing, the corn grain is manually filled by the farmers into 50 Kg bags made from polythene. As per the farmers, availability of the bags is not a problem as these materials are normally available in the market at an average price of 15 birr per piece. In the cases of bulk sales, it is customary for the buyers to supply sacks, with no cost for the farmer, whereas in occasional instances of need based sales the farmer always keeps the sack for himself.

Storage

The study area farmers harvest maize twice a year in a volume of 30 quintals per hectare in a total of 304 hectares, this would pack out to 18,240 bags of 50kg per cropping season.

[7]Boxall, Robin (1998) *Grains post-harvest loss assessment in Ethiopia. Final report. Project No. T0725 (NRI Report No. 2377).* [Working Paper]

According to a study by Boxall, Robin (1998) the average storing loss for maize is 4.6% in Ethiopia, equivalent to annual loss of 840 quintals per year. Therefore, based on the gross margin calculation, the total loss to the value chain resulting from lack of improved storage is 377,568 birr per annum. One way of tackling this constraint would require constructing storage facilities for grain and for fodder separately

However, the benefits of improved storage system are not limited to minimizing post-harvest losses. Perhaps more importantly, it would help to strengthen the bargaining power of farmers over the selling prices of not only maize but also other crops such as Sudan grass fodder or seeds avoiding the urge to sell at cheaper rates forced by lack of storing space. Now, farmers can wait until market prices optimize.

Cognizant of this fact, additional study and design of post harvest storage facilities is required to bridge this gap. Storages facilities can be of two types (1) Individual (household owned) storage facility and (2) communal (community owned) Storage facilities. If community labor and material contribution is ensured, the cost to finance of construction of one individual storage facility is estimated 40,000 -50,000 birr and that of the communal is estimated about 850,000 based on the consultant's rough engineering estimate during the study. The communal store provision would also involve an annual manpower cost of approximately 19,200 birr for two storekeepers, assuming a monthly salary of 800 birr per storekeeper which can be handled by the community in the long run.

5.9.7 Chain 4: Transport

Although the Kebeles are located at a fairly close distance from Gode town within 10kms, the badly weathered the earthen road has prevented commercial transport service for people and goods. Nevertheless, problems associated with transporting products to market have not been emphasized by the farmers as an issue during the discussions. When it comes to moving agricultural products, the farmers have two major options: medium sized ISUZU trucks and donkey carts.

1) ISUZU trucks: in cases of bulk sales of crops the traders normally bring their own transportation facility to take the products to their stores in Gode town. ISUZU tracks are the most commonly used means of transport. The cost of transportation is covered by the traders.

2) Donkey carts: this transport system comes into play when farmers occasionally require selling a certain amount of product at Gode market to raise some cash, usually on market days. Rental donkey carts services are available in the project area that charge up to 30 birr per 50 Kg sack for maize grain or 100 birr for one donkey cart of green maize fodder , which is considered relatively very expensive considering the proximity to the market. As far as transportation is concerned, based on the assumption of 2% crop loss for maize, the value chain loss is estimated at 164,160 birr per annum.

5.9.8 Chain 5: Marketing of maize and fodders

Market outlet

The market outlet available for the irrigation products is the Gode market with the following typical distribution networks for grain production

1. Maize: 1.1 Farmer ➔ Wholesaler ➔ Consumer–(for Grain product)

2. Maize: 2.1 Framers ➔traders r ➔ Consumers (livestock owners/consumers)

3. **Sesame** 2.2 Farmers ➔ Processors/Oil ➔ Distributors ➔Consumers (oil seed product)

4. Sesame 2.3 Farmers➔ Processors/Oil ➔Distributers ➔Retailers ➔Consumers (Fodder)

3. Sudan Grass 3.1Farmers ➔NGOs/Government ➔Consumers

4. Crop Residue 4.1 Framers ➔Traders ➔Livestock owners/Consumers (maize or sorghum)

As far as green fodder is concerned , taking the Gode fodder market as an example, farmers primarily sale to traders most of the bulk of their products , and direct farmer to consumer transaction is rare and involve minimum volume except when there is severe drought. It is the traders that link farmers to consumers.

As per farmer's discussions, transactions took place without intervention of middlemen or brokers. Prices are usually negotiated between the two parties exhibiting high fluctuation Farmers complain that price of green maize fodder or sorghum can fall to as low as 40 birr per a donkey cart and sometimes farmers could not even find any buyer at all during heavy rainy season except in the first week of the rainfall when the livestock are weak and the pasture is not germinated.

Market knowledge of product availability

The issue of market knowledge is discussed from the perspective of market link with other potential consumers such as pastoralist community away from the production center. As far as maize fodder and sesame oil seed are concerned, it seems that there is no alternative market to the established market system in Gode at least for the time being. However, for sesame oil seed cake (Mankal) and Sudan grass a number of potential buyers have been identified:

1. Government projects involved in Fattening
2. NGOs supporting drought affected community in the region /country or Horn of Africa
3. Private institution undertaking feeding of livestock

Market Intelligence Suppliers

Market information in local language is spread by Ethiopian Somali Television (ESTV) Progamme on weekly basis on every Friday including the national radio Somali Programme. The ESTV broadcasts retail market price information on the products on a range of agricultural commodities including cereal (maize and Sorghum), pulses (red bean), oil seed (Sesame), livestock prices for goat, sheep, cattle and camel market price information released are based on Jigjiga, Gode, Kabridahar, Dagahbur, Jarati, Hartsheikh and Moyale towns major markets.

Some of disseminated price data have direct relevance to farmers. But being more of consumer oriented, it is to be systematically organized in such a way that farmers could benefit from it.

However, fodder market prices have not been part of the market information broadcasted by theses media. And for this reason consumer and farmers do not have information of market reports. Since the great majority of pastoralists or farmers or traders might not own a television set and radio receivers and there is no electric power supply in their villages an alternative action that disseminate the fodder market information should be required by the concerned bodies. .

The only market information, as described by farmers, concerns collecting of oral and visual information regarding the types of crops planted and the amount of land cultivated by farmers in the neighboring Kebeles and Woredas. They use this information as a guide to readjust their crop allotment and avoid market over supplies and price falls every season.

Sesame Production Overview

The study area is one of the 12 major Woredas suitable for growing of Sesame in Somali regional state. These 12 Woredas are located along Wabe Shabelle, Weyb, Genale and Dawa Rivers. But due to weaker extension services and lack of improved seeds such as Kelafo 74 and Addi varieties and also lack of market linkage in the study area, there has been little emphasis to boost income from production of sesame. Obviously, sesame is an important agribusiness sector in Ethiopia and therefore one of the six priority crops in the Agricultural Growth Programme (AGP) of the Ethiopian Government. Ethiopia is the fourth producer and second largest exporter of sesame in the world. Sesame accounts for 90% of the value of exported oilseeds, estimated at 379 million USD (FAOSTAT 2012). The sector is a perfect example of food security improvement 'through the market'. From a development and poverty reduction perspective, enhancing the inclusiveness of sector, with a decent share of the wealth created for small farmers and laborers is a point of public concern.

Identified constraints

As discussed so far, gross margin is significantly affected by (i) the ability to access and use improved seed to boost productivity to the maximum level (ii) the ability to operate and maintain water pumps, and (iii) the ability to harvest and thresh efficiently.

The alleviation of these constraints would add significant value to the irrigation farming as a whole and through potentially higher sale prices higher return to the producers. It would require (i) significantly strengthening extension support service to the farmers through which to secure reliable, consistent supplies of improved inputs and (ii) a mechanism to create among farmers a capacity of pump maintenance and to keep a minimum spare part stock of fast moving components. In addition, a series of farm level and market level constraints would need to be alleviated, namely, storage availability, farmers knowhow and market information.

The constraints identified along the value chain mapping can be broadly summarized as follows:

i) Input supply

Improved seed: chronic lack of improved maize seed in the project area has forced the farmers to depend on the less productive breed. This situation has led to under production and substantial loss to the farmers and to the maize value chain as a whole.

Chemical fertilizer: The fact that farmers can't access the required fertilizer inputs through governmental channels of agricultural extension offices and farmer cooperatives or unions has forced them to purchase from private suppliers often at inflated prices.

ii) Production

Pump maintenance: significant proportion of existing pumps is out of operation due to maintenance related problems resulting in reduced production while pushing cost of production up. If this problem is allowed to continue, it has a potential to threaten the viable operation of the irrigation farming activity by causing large scale production failure.

Unavailability of fast moving stock and lack of basic maintenance skills has compounded the problem and paved the way for unethical pump technicians in the town to exploit the farmers.

Farmer's skill: the study shows that farmers lack skills in the areas pump maintenance, input utilization and product marketing which are seriously hampering farm productivity and forcing the farmers to loss income.

iii) Post-harvest

Improved storage facility: the farmers do not have improved storage system and hence lose substantial amount of their products and incomes annually to paste attacks and by being forced to sell their products at cheaper prices due to storage constraints. Luckily for the farmers, a study and design of two modern stores commissioned by GIZ is now at its final phase and hoped to alleviate the issue.

iv)Marketing

Weak marketing information: the farmers do not have reliable means of getting vital marketing information that would help the farmers to plan production, sales and product pricing. As a result over productions and market over supplies happen from time to time.

Poor linkage with potential customers: the study has identified a number of potential customers in Gode town that could represent a substantial market for agricultural products coming from the study area. However, this has not been exploited so far by the farmers.

v) Weak performance to farmers support systems

Agricultural extension offices and Farmer cooperatives: these institutions are vital in increasing the productivity of agriculture as they are the vehicles through which farmers become acquainted with latest technologies and farming techniques, improve agricultural skills and access market information.

Due to intensiveness of its activities, perishable nature of most of its products and market orientation of its production irrigation agriculture is extremely reliant on extension supports. The DAs are supposed to live among farmers, facilitate the supply of various inputs, give trainings and supervise implementation of plans, compile basic information and solve problems. All these are lacking in the study Kebeles.

In reference to the different categories of constraints, the following activities are suggested:

i) Access to Input supply

1. The lack of availability of improved inputs particularly concerns improved maize seed, which is having prominent negative impact on the output. This is an ongoing constraint for many years. Low quality seeds occasionally supplied by the private sector are causing occasional crop failures with significant income losses. Therefore, it is important to ensure coordinated purchasing of inputs, through governmental channels and farmer cooperatives, according to the forecast requirements of farmers.

ii) Field production

a. Pump maintenance is a major issue for all farmers and for all types of irrigated crops. Developing a program to create capability within irrigation community, assess and implement a mechanism for easy and affordable access to fast moving pump components.

b. Current farmers practice regarding modern agricultural inputs, particularly the backward and sometimes risky mechanisms they use for pest control is indicative of knowhow limitations. Therefore, it is essential to carryout awareness creation program to close this gap.

c. In discussion with the farmers, it has been understood that many farmers are worried by the trend of farm land hardening. It would be prudent to conduct investigate the extent and the root causes of the problem come up with implementable solutions.

d. Some technical issues such as weak irrigation structures in the fields and getting water canals across gullies are posing huge challenges to the farmers considering their technical expertise and resource limitations. Intervention in this regard would be important enabling factor for the success of the irrigation agriculture.

iii) Post-harvest

e. Improve storage facilities for the farmers to minimize storage losses and to give farmers controlling power over selling schedules. One major step in this direction would be implementing the ongoing study on store constructions.

iv)Marketing

f. Formulate a structure to coordinate the linkage between the markets and the farmer is a significant and critical marketing requirement for all the fodder products of the studied kebeles.

g. Identify potential markets and improving farmer's access to relevant market information is vital. A useful way would be to enable the farmer cooperatives to play this role.

v) Farmer support systems

h. Agricultural extension under the irrigated farming scenario in particular, clearly requires an improved approach to allow it to become a useful tool in the sector. Effectiveness enhancing measures through deployment of capable DAs, capacitating the available ones combined with performance monitoring is essential.

i. In the same way, existing farmer cooperatives need to be strengthened in terms of legal status, operational guidelines and market assessment techniques to make them relevant actors in the value chain improvement.

j. It is also recommended to further expand the value chain study to encompass the other categories of products in the study area, as discussed in the preceding sections.

Section-VI: Summary of Identified Constraints and Conclusions

6. Constraints, recommendations and conclusions

6.1 Constraints

Lack of knowledge and skills in the production of natural; pasture and hay and marketing as well in the region is the key challenge where the such feed is always brought from the highland areas of the country although it is known that the region has huge potential in the region.

Lack of improved seed for maize, Sesame and other improved forage crops: the recommended improved variety of maize for propagation is (Melkasa- 2) and for Sesame is Adi or Kelafo 74 Verities. This variety however is unavailable through the seed suppliers and the farmers mostly rely on the less productive traditional variety and long cycle one. This is the key constraint that creates under production and substantial financial loss to the individual farmers and to the maize and sesame value chain as a whole. The regional Seed Enterprise Office is mandated for supplying improved Seeds to the region. However, there is coordinated effort among stakeholders involved to make plan and arrangement and link the farmers to the seed enterprise for timely supply of seeds.

Lack of water pump maintenance service: this is a major issue for all irrigated crops and farmers. Aging pumps, lack of maintenance capability amongst the farmers and poor quality maintenance service provision by the private sector all combine to influence the output in the field. Pump failure at critical stage of maize plant development has a potential to bring total crop failure.

Lack of improved storage system: substantial volume of maize is lost as grain or residue annually due to paste attacks as a result of backward storage system. This constraint also contributes to the low financial return as the farmers have to sell their products at cheaper prices due to lack storage space. In this regard, implementation of the ongoing storage study would be a bid step in the right direction.

Lack of access to market information and customer linkage: provision of systematic market information is nonexistent for the target farmers and their productions. No attempt was exerted to make linkages with potential institutional customers located in the study sites and nearby towns , particularly for Sesame oil seed cake and Sudan grass as well.

Weak farmer support system: poor performances of *Agricultural Extension service and Farmer cooperatives* limit farmer's access to and proper utilization of modern farm inputs, and prevents their access to vital market information and ability to identify potential markets and establish linkages with available customer.

Obviously, most of these constraints are relevant to the most fodder crops. For example, issues related to pump maintenance, weak agricultural extension service and farmer cooperatives, market information affect all crops and livestock products equally. Storage problem is shared by Sudan grass, Maize, sorghum, sesame including for grains and fodder as well.

6.2 Recommendations

On the basis of these findings, the study suggests activities that would alleviate the constraints and improve the major chain performance weaknesses identified. Coordination between key stakeholders is key to effective planning and implementation of proposed solutions. The major recommendations are the following:

- Ensure coordinated purchasing of inputs, through governmental channels and farmer cooperatives, based on forecasted requirements of farmers.

- Develop a program to create pump maintenance capability among irrigation community and assess ways to ensure farmer-managed access to fast moving components.
- Improve farmer's access to improved storage facilities by consulting farmers on the types and design suitable for their products and ensure ways of managing structures for sustainable operation.

- Key stakeholders have to work in coordination and utmost commitment to enable the extension services become effective tools of rural development in the study Kebeles in order to foster the productivity of fodder for better livestock productivity and food security

- The same effort should be exerted to strengthen farmer cooperatives and unions in terms of ensuring their legal status and equipping them market assessment techniques on fodder production and marketing.

- Assist the local farmers and cooperatives on improving access to input to increase fodder production.
- Similarly support establishment of Water Users' Association (WUAs) in irrigated areas would support the sustainability of the irrigation schemes to enable farmers maintain irrigation systems and contribute fund for input purchase on so on. .
- Take measures to improve the utilization of pest control through chemical, biological or integrated Pest Management System (IPMS), pest and diseases seem harmful to the production of fodder crops such as maize and Sudan grass production which requires careful protection at early and developmental stages of the fodder crops.

- Design proper intervention to resolve the technical problems that farmers are facing in the fodder sector development in relation to irrigation canals in Gode and water sources particularly in Shinile, Eerer , Shabelay and Harorays districts.

- Support post harvest improvement measures for instance maize and sorghum residue preservation through chopping and silage making, management of wheat straw as a fodder through hay making, management of natural pasture hay and value addition of sesame oils seed cake.
- Support the ATMR and MNBs producers through market linkage with local customers and relevant institutions.
- Lastly, like the constraints, the above recommendations have a potential to address most of the constraints faced by the fodder sector value chain.

6.2 Conclusions

The market transactions of roughage such as residues and green fodder of cereals (maize and sorghum), Agro Industrial By Products (AIBP) (wheat bran, wheat middling, sesame oil seed cake) and mixed feeds such as Activated Total Mixed Ration (ATMR) and Multi Nutrient Blocks (MNB) is showing increasing trend, even though its size is still small considering the livestock population of

Somali Region. Crop residues and green fodder such as sorghum and maize are the most marketable roughage feed in all the study districts and used as supplementary feed for livestock. Natural pasture areas particularly in Harorays and Shabelay districts are declining overtime due to the expansion of crop cultivation and urbanization. Crop residues and green fodder of particularly sorghum is also exported to the neighboring Somali Land such as Wajale town from Harorays and Shabellay districts. The study shows that marketing of natural pasture hay is totally absent in the study districts except by Jijiga, Gode and Dire Dawa air port which sell the hay to the nearby pastoralists and sometimes donate freely during severe drought period. The air ports do not have strategic plan of fodder production and marketing whereas the hay is grown due to the fence of the air port and hay is harvested and sold as a safety precaution against unexpected fire incident within the air port premises as the result of the dry pasture. Hence, in most of the study areas there is an acute shortage of natural pasture hay supply in domestic market. The most commonly marketed AIBP in the study area are, wheat bran and wheat middling particularly in Harorays, Shabelay, Shinile and Erer study areas and sesame oil seed cake in Gode study area. In general, commercial feed supply is emerging in urban and peri-urban parts of the study areas. The use of feed from commercial sources is, however, very limited due to shortage of feed supply and inefficient marketing system and this problem become more serious in rural areas. In most of the potential peri-urban and urban areas of the study areas there is feed availability problem due to overgrazing of the areas, agricultural land expansion of settlement areas. Hence, there is a need for interventions to develop feed markets in Somali Region. Therefore, in order to promote livestock production, the feed production and marketing aspect need to get due attention. Interventions to increase the feed supply, improving ration formulations both in the nutritional and economic area and developing feeding strategy based on locally available feed resources are urgently needed which could vary depending on the resource base of a particular intervention area.

Moreover, ways should be devised for the better conservation, utilization and marketing of conventional feed resources produced as natural pasture hay, crop residue and improved forage hay such as Sudan Grass. In regards to fostering the industrial by products marketing, livestock production in Somali Region should be commercialized (market-oriented) and feed marketing aspects have to receive at most focus and attention. In order to achieve commercialized livestock production system, an enabling environment including strategic policy in livestock feed marketing is

the most important aspect that needs to be addressed and implemented in a value-chain approach. On the other hand, unless there is a wider investment in the sector mainly in modern/commercialized livestock farming (dairy, fattening, poultry etc.), the demand for AIBP such as sesame oil seed cake and wheat bran and mixed feed types such as ATMR and MNB will remain low. Thus, it is important that there is a planned support of commercialized livestock farming where the existing feed resource is utilized efficiently. On top of this, there is also an opportunity for private sectors to enter into the feed mill industry if the market can be formed and expanded. Consequently, it is also important to support the private sectors to enter into the feed mill industry so as to supply affordable feeds for modern livestock farming as well as to the smallholder semi-commercialized livestock keepers. Therefore, (1) the public support in terms of agricultural extension, credit and infrastructures needs to be strengthened to support the sector mainly in urban and peri-urban areas in order to well link the feed sector with modern livestock production; (2) in order to increase demand for compound feeds such as ATMR and MNBs produced by Suffi enterprise in Jigjiga and Himilo Cooperative in Erer towns which operate at 50% of their capacities improved efficiency is required, and different marketing strategies should be promoted like mini package of the feeds, demonstration of the use of compound feeds to users, awareness creation through advertisement and training of livestock producers, and implementation of vibrant public quality and standard enforcement mechanism, linking cooperatives with feed supply, etc.; (3) investment promotion in animal feeds need to be promoted for increased competition in the feed markets; (4) there should be strict ban of export market on non-value added feed ingredients while up-grading the capacity of feed processing industries to compete in domestic as well as in international markets; (5) improving the transparency of market operations including government policies by providing equal access to all participants;. Thus, it needs critical policy decision to avoid double taxation. The quantitative analysis of the existing livestock feed market in the future (Domestic vs. Export) in a holistic system approach warrants further research, because feed cost is the major factor that dictates the feasibility of livestock production in Ethiopia.

The study demonstrates that fodder as an economic activity is vibrant in the region supporting the Agro pastoralist communities in the study sites. The system has developed from and depends on the major rivers, seasonal streams, boreholes and rain fed where the agro-pastoralists use to cultivate their food and fodder crop. The production and marketing of fodder in the region has evolved

through three systems (1) traditional way of production and marketing of fodder which includes production and marketing of cereal crop residues and green fodder and production of sesame oil seed cake, (2) support from Government programs and offices such as Regional Pastoral and Agro pastoral Research Institute and Regional Agriculture and Natural Resource Development and NGOs for the cultivation of improved forage crops such as Sudan grass and self organized enterprises and cooperatives perhaps with some support from Government and NGOs on the production and marketing of ATMR and MNB. The Regional Pastoral and Agro pastoral Institute intensified the practice through introduction of more productive fodder types and varieties including the building the local knowledge and capacity in production and use. Although a substantial quantity of fodder is produced, the production of fodder in the region is not enough in quantities to support and serve the increasing demand particularly during dry seasons in peri-urban livestock farmers in nearby towns of the study areas such as Harorays, Shabelay, Erer, Shinile and Gode, and also to the Agro pastoralist and pastoralists communities in the region. These issues have risen the trading of fodder as a business generating interest and increasing participation.

However, for the fodder production and marketing, there are different constraints across the study areas. The seasonality of the local streams in Erer district, the high operation costs of irrigation water pumps in Gode area and along all major rivers, the problem of Electric power interruption for long time by ELPA in Shinile district which depend on many boreholes for irrigation, the variability of rainfall in all sites and particularly in Harorays and Shabelay districts and lack of improved seeds are the major bottle necks to increase the production of fodder in the region. The actors in the fodder market do not have a clearly coordinated supply chain system. Although not directly demonstrable, cultural systems have played a role in allocating production, transportation and retail functions particularly in the case of crop residues, green fodder maize and sorghum, purchase of wheat bran and marketing of sesame seed oil cake by various actors. The actors enjoy varying margins from their participation; with the Sudan grass producers' cooperatives, wheat bran factories and ATMR and MNB producers taking a substantial proportion of the net benefits followed by agro-pastoralists. External actors such NGOs have played key roles in input supply such as seeds and fuel, lowering the l production costs and enabling the realization of positive returns by the agro-pastoralists. This kind of external support entails a risk to the sustainability of the system that requires to be addressed.

Therefore, the study recommends a further development of the fodder market system in order to make it more productive and to its actors. This should be through providing capacity building and exploring with them how to best explore the opportunities offered by increasing demand, while safeguarding the environment. External factors such as the Governments, Research Institutes and NGOs are and will continue to be crucial in supporting low cost but high production of the fodder and its delivery to consumers. The study also recommends more detailed research of the system to get better quantification of the fodder products and benefit distribution among the actors to better advice any arising governance or relationship system for mutual and possibly equitable benefit of actors.

Annexes-A: Summery of Key Statistics

	Unit	Harorays	Shabelay	Shinile	Erer	Gode	Remark
Percentage off take cattle (%)	%	1	2	2	0	3	TLU cattle sold or slaughtered past 3 years/(3 * total cattle TLU)
Percentage off take sheep and goats (%)	%	2	2	2	2	2	TLU shoat sold or slaughtered past 3 years/(3 * total shoat TLU)
Average annual income from milk sales	Birr	17,258.27	33,573.10	32,093.20	21,787.32	29,531.42	Sum of (Average daily milk sales (USD) by month x Days in month) for all 12 months
Amount spent on purchased feeds	Birr	8,463.00	15,315.83	10,360.00	5,530.00	4,255.00	Sum for all purchased feeds of (Price in local currency x Quantity purchased in local units each time purchased x Number times this amount is purchased in a typical year)
Percentage of income from milk sales spent on purchased feeds	%	49	46	32	25	14	Amount spent on purchased feeds / Total income earned from milk sales
Total amount of milk produced per year	Liters /hh	1606.191667	2739.216667	2247.4	1478.02	2259.1	(average monthly yield for Jan) + (average monthly yield for Feb) etc
Average price received for	Birr	14.23	16.10	20.66	19.59	17.41	Monthly average price milk/liter in local

milk throughout the year							currency
Average price received for milk throughout the year	USD	0.70	0.80	1.02	0.97	0.86	Monthly average price milk/liter in US dollars
Total amount of milk retained throughout the year	Liters per hh	448.4708333	630.1603333	635.46	362.91	550.6	(Average milk retained for household use for Jan x 31) + (Average milk retained for household use for Feb x 28) etc
Percentage of milk sold	%	72	77	72	75	76	((Total amount of milk produced per year - Total amount of milk retained throughout the year)/ Total amount of milk retained throughout the year)*100
Average production per female dairy animal per day	Liters /cow/d	0.75	0.94	1.41	1.16	0.89	Total amount of milk produced per year/(sum of TLU of female dairy cattle)/365
Average production per lactating dairy animal per day	Liters /cow	3.32	2.59	3.19	2.42	2.51	C8/(sum of TLU of female lactating cattle)/365
DM amount (kg) of total diet per household	Kg	35968.620	25816.274	12939.767	13595.795	62934.217	Sum of DM from different diet components (from Contributions Table)
ME amount (MJ) of total diet per household	MJ	342154.281	244201.298	123617.002	129907.511	590079.909	Sum of ME from different diet components (from Contributions Table)/1000
CP amount of total diet (kg) per household	Kg	2956.603	2144.365	1148.702	1157.152	5083.549	Sum of CP from different diet components (from Contributions Table)/1000
CP:ME ratio	g CP /MJ	8.641	8.781	9.292	8.908	8.615	Total CP / Total ME
Milk yield per MJ ME	Liters /MJ	0.005	0.011	0.018	0.011	0.004	Total amount of milk produced per year /

							Total ME
Total crop area per household (ha/hh)	Ha	2.7325	3.0875	0.5645	0.9935	0.9705	Grand total from "crop cultivation" graph
Total forage area per household (ha/hh)	Ha	0.6125	0.447916667	0.2705	0.275	0.8	Grand total from "fodder cultivation" graph
CR yield per ha (=total CR DM/total crop area)	kg DM /ha	878.03	631.22	663.99	452.14	3400.25	DM from crop residue/Total crop area
Forage yield per ha (=total forage DM/total forage area)	kg DM /ha	13361.22	9798.14	6630.33	6922.27	15382.50	DM from Forage crops/Total Forage Area
Forage crop area as percentage of cropped area	%	18	13	32	22	45	Total Forage Area / (Total Forage Area + Total Crop Area)

Annex--B: Matrix of Fodder Production & Marketing and areas of Priorities for intervention Public Sector

Annex--1: Matrix of Fodder Production & Marketing and areas of Priorities for Intervention Public Sector

Domain	Partners	Priority Intervention areas
Policy and coordination	Ministry of Agriculture and Regional Agriculture and Natural Resource Development Bureau	- Support extension services such as training module development for fodder production, preservation and marketing - Training on improved package for sesame seed oil processing - Contribution to elaboration of training manuals (other forage crops)
	Regional Livestock and Pastoral Development Bureau	Support trainings on feed formulation and marketing - Initiate the opportunities for making links between policy and practice, both for Livestock Bureau and Fodder production and marketing
Research and extension	Regional, zonal and *Woreda* Administration in collaboration with Regional Agricultural Bureau and Regional	Especially the *woreda* administrators need to actively involved in the campaign for the improving the agricultural practices

	Research Institute (ANRDB and SoRPARI	
	Regional Bureau/Woreda Office of Agriculture	collaboration on fodder production in the region is required with this Bureaus and Woredas
	Regional Seed Enterprise	Improve and support for improved forage seeds supply ,
	EIAR	Support in forage seed multiplication and conduct experience sharing in the region
	Universities	Include fodder production in the leaning courses and curriculum and build the capacity of the extension workers on fodder production and marketing
Cooperatives	Cooperative Promotion Agency (federal, regional and *Woreda*)	Support capacity development activities , among others cooperative marketing and explore possibilities for collaboration at Woreda *level*.
Marketing	Zonal and Woreda Trade and Transport	Collaboration for information and monitoring of fodder spot market prices (Woreda and Kebele levels)
	Ethiopian Commodity Exchange (ECX)	Support on collaboration for awareness creation on fodder grading and quality - Intended collaboration for market information. Install Bill board at Jijiga , Gode, Harorays, Shinile, Erer towns and other relevant areas of the region

Annex- 2: Matrix of Fodder Production & Marketing and areas of Priorities for Intervention for Private Sector

Domain	Partners	Priority Intervention area
Cooperatives and farmers	Unions	Work with Unions on collaboration for market linkages and training on marketing
	Cooperatives	Same subjects as for Unions - Training on contract farming and organic production for
	NGOs	Training of the unions and cooperatives on market linkage with supplier of seeds and buyers of fodder and support on

		certification issues
	Investor Farmers	Support some innovative investor farmers These might be stepping stone for more collaboration with investor farmers.
Finance	NGOs/GIZ	Invited to trainings and workshops, for airing their products and conditions for access to credit, and sensitization of farmers on saving culture.
	SACCO	Potential case to be further developed or inspiration for other SACCO's in Gode and other areas where SACCOs already exists
	Cooperative Banks	Can support in linking up to farmers and cooperatives on credit and loan on fodder production and marketing including on provision of training on different subjects. Promising for further collaboration (training on different subjects, experience sharing, for instance on coffee cooperatives)
	Commercial Bank of Ethiopia (CBE)	Support on providing financial services such as credit and load arrangements particularly to fodder producer cooperatives and traders
	Ethiopian Development Bank	Can provide support to investors working on production of fodder
	Ethiopian Insurance Company (EIC)	Can be potential for services to investor farmers and also very important on compensating in the case of losses due to disease and other disasters such as floods.
Fodder processors	Local Processers of sesame , ATMR and MNB	Support on product quality and quantity improvement and market linkage support is required
	international buyers	Contacts with international buyers through NGOs like GIZ where the aim is to have clear demand and - if possible – a pilot order and delivery of particularly sesame by product and Sudan grass to Djibouti, Somalia and Kenaya
rotation crops Supporters	rotation crops	Organization like GIZ can explore options for cultivating different forage crops instead of cultivating same crop every year on same plot which will affect soil fertility and the aim is to

		have clear demand and - if possible - a pilot order and delivery for some other food crops such as maize and sorghum and next year plant the land with sesame.
Production factors	Farm mechanization supporters	Support in providing machinery renting services to nearby farmers (tractors, ploughs and planters) and harvesting as well such as combine harvesters. This relation is expected to be expanded (contract farming for sorghum, wheat and maize).
	Somali Region Television	Television programmes on best practices for fodder production and marketing with improved coverage.
Media	Somali region Radio at Jijiga and Addis Ababa	Radio programmes need to support information on fodder production and marketing with improved coverage to all areas of the region

Annex -3: Summary of major constraints and recommendations

Crop/Issues	Value Chain Stages	Constraints	Recommended actions
1.Common issue to all fodder crop production	1. Production stage	1. Frequent breakdown of water pumps. Farmers lack technical skills. Private technicians located far from farm not adequately qualified, untrustworthy.(particularly in Gode area) 2. Collapsing water distribution structures requiring frequent maintenance and inability to build gully crossing structures for 3. Lack of farm tools for minimum land tillage Irrigation canals are becoming tough challenges	1. Develop a training program to create pump maintenance capability among the farming community (village pump doctors) 2. Assess possibility of establishing farmer-managed pump spare part supply system. Provision of seed capital could be critical necessity. Assist in irrigation water management and support with geo-membrane installation to minimize seepage 3.. provide hand tools for cultivation 4. Liaise with government to solve problem of electric power supply for the irrigation boreholes in Harawe site Support production of improved forage types such as Rhodes, alfalfa, befell, lablab, Panicum, etc. 5. Conduct in-depth assessment and provide technical support, Investigate

		to the farmers considering their limited technical expertise and resources. High seepage of unlined canals 4.crop wilting due to lack of water in Shinile Harawe site district, due to lack of electric power supply by electric Authority negligence 5. Provide crop protection support to farmers 6 Lack of tractors for tillage	the root causes and implement research based solutions. . Use traditional and endogenous knowledge of controlling pests and diseases . 6. Provision of tractors with implements
2.Crops - fodder	**i. Input supply**	1. Absence of improved seed/Melkasa2/, Sudan grass etc it is not frequently supplied by government or private channels. 2. Incidents of poor quality local seed supplied by traders.	1. Encourage supply of improved variety through coordination of key stakeholders (Agri Office, Cooperatives, NGOs, private sector etc) 2.Increase farmers knowledge on seed management (quality) and adoption
	ii. Production	Refer Common issue to all crops	Refer Common issue to all crops
	iii. Harvesting/Storage	1. Traditional system (Stick), poor fodder quality and wastage of fodder particularly sorghum 2. Absence of improved post-harvest storage facility causing crop loss and affecting product quality. Also compelling farmers to sell at cheap prices	1.Provission of combine harvester and bailer to fodder producing cooperatives 2. Research improved technology that work best in Somali context including manual bailer 2. Support construction of post-harvest storage facilities individual and communal stores.
	iv. Transport	Lack of adequate transport facilities	Provision of Donkey with Carts to the study sites to transport fodder to market
	v. Marketing	Refer Crosscutting Constraints below	Refer Crosscutting Constraints below
	ii. Production	Refer Common issue to all crops	Refer Common issue to all fodder crops
	iii. Storage	1. Absence of storage facility forcing the farmers to sale at cheap prices	1. Provision of improved post-harvest storage.
	iv. Transport	No serious constraint	Provision of Donkey with carts to cooperatives and road rehabilitation

	v. Marketing	Lack of linkage between producers and consumers	Establish linkage between producers and consumers
	ii. Production	Refer Common issue to all crops	Refer Common issue to all fodder crops
	iii. Storage	Lack of storage facilities for harvested or processed fodder	
	iv. Transport and handling	Lack of linkage between farmers and transporters	Assist construction of fodder storage facilities in the target areas
	v. Marketing	No market linkage	Support in market linkage between producers and consumers.
5.Sesame	**i. Input supply and utilization**	Lack of improved seeds such as Kelafo 74 and Adi verities	Encourage supply of improved variety through coordination of key stakeholders (Agri Office, Cooperatives, NGOs, private sector etc) 2.Increase farmers knowledge on seed management (quality) and adoption
	ii. Production	Lack of sesame production management knowledge and skills	Train farmers on production improvement to increases yield in terms of fodder
	iii. Storage	1. Absence of modern storage facility causing los of fodder and affecting fodder quality. Also compelling producers or farmers to sell at cheap prices	1. Support cooperatives on the storage facilities construction for improved fodder handling and marketing
	iv. Transport	Lack of donkey carts	Provide donkey carts for the transportation of the cake from production site to the market place
	V. processing	Processing mill is far away from the villages and farmers are paying high cost for processing Processing mills are not enough to process when there is bulk production	Support with provision of processing mills to cooperatives for increased production of sesame oil seed cake
	Marketing	Lack of knowledge on the product in other parts of the region	Introduce the product in other parts of the region and establish linkage between producer and consumers in the region.

Annex -4: Cross Cutting Issues and Constraints

Category of constraint	Constraints	Recommended actions
i. Marketing	**1.Fluctuation of market prices** **2.Absence of market intelligence** **3.Lack of linkage with potential customers**	1.Establish a mechanism for systematic collection and provision of up-to-date market intelligence on prices and supply 2.Improve coordination between producers in different kebeles to avoid overproduction and market flooding 3.Conduct market assessments to identify new potential markets

		4.Enhance farmers awareness on product quality issues (Avoiding contamination by fuel during transportation, exposure to rain and protection from pest attacks) 5.Identify potential customers (Institutions, cafeterias, etc) and establish contract based linkages so that producers could directly sell to them 6.Construction of improved post-harvest storage facilities will help fodder producers to delay sales until price is optimized 6. Particularly for Sesame support on Agri Business skills and knowledge to make them competitive in national and international markets establish linkage between cooperatives, improved seed suppliers, transporters, and processers, Ethiopian Commodity Exchange for grading the product.
ii. Poor Agri. Extension service	**1.Incomplete deployment of DAs** **2. Existing DAs lacking commitment**	1.Promote full deployment of all required DAs in coordination with District Agri. office 2.Provision of required accommodation to DAs within the kebeles of their assignment support in provision of Das house and office in the four Kebeles
iii. Weak cooperatives	1.Weak organizational arrangement and performance of existing cooperatives preventing them from playing key roles in collecting market intelligence, assessment of new markets, supply of modern inputs, coordinate marketing and production with other cooperatives, etc	1.Strength cooperatives in terms of legalization, clarity of objectives, etc and link to Saving and Credit services 2. Establish Water Users Association in Kebeles along the River

Annex -5 Vulnerabilities, Risks and Coping strategies in the study areas

Key vulnerability	
1. Flood incidents and recurrent drought 2. rainfall delay or failure and draught 3. insecurity and conflicts –inter clan or related clans over land ownership by different communities 4. environmental degradation–gull/erosion invasive plant specious such as prosopis and /Bakarkate 5. lack of knowledge on natural pasture hay making for marketing 6. market price fluctuation on feed 7. poor water availability and accesses during dry times in Erer, Harorays and Shabel**a**y 8. Fodder crop pest and disease 9. high price for fodder crop inputs (seed and fertilizers) 10. lack of raw materials for wheat factories 11. high price of fuel for irrigation pumps 12. Poor road , extension services and infrastructure	13. Harmful worm that attaché maize and reduces biomass of the fodder and residue 14. Migratory birds (that damage Sorghum, sesame, maize and Sudan grass etc) and locust that damage crops and pasture. 15. Wabe Shabelle River and stream in Erer and Shinile cause suspension of Agricultural activities during high flood times 16. Problem of accesses such as Shinile (Harawe during rainy **seasons**)

Main risk minimization strategies	Main coping strategies
1. Natural pasture hay production and conservation , construction of feed storage facilities 2. Rehabilitation of water points and range land during dry season 3. Establishment of fodder and seed bank 4. water harvesting and conservation –water spreading Wier construction 5. drought tolerant early maturing fodder crops cultivation 6. increased cultivation and diversification of fodder crops 7. fodder crops pest and diseases control through pest sides and Integrated Pest Management Systems	1. migration of livestock 2. Provide cash for work scheme for range land rehabilitation and water harvesting 3. diversify income sources –agro pastoralist have better opportunities to do so –cultivation of both food and fodder crops through irrigation 4. Strengthen early warning to reduce impact of weather on fodder production 5. Use traditional or indigenous knowledge to overcome the impact of fodder crop pests and diseases

Annex –C: Data collection questionnaires, guidelines and check lists

Location /Community:	
Date of Interview:	
Interview Respondent:	
Facilitator:	

Date of Interview:_____
Interviewer Name:_____
Respondent Name:_____
Landholding Category:_____ Landless Small , Medium , Large (Circle one)
Occupation:_____
Name of Settlement (Kebele Center) :_____
Name of Village(Sub Kebele):_____
GPS Coordinates of Interview Location: Latitude _____ Longitude _____(in deg, min, sec)
Note : This is the It is interviewer's responsibility, not respondent's, to determine GPS coordinates (if possible).
How Much Land Do You Own? Acres , Hectare, Local Units (Circle one)
How Much Land do you cultivate Acres , Hectare, Local Units (Circle one)
If Local Unit _____ 1 Hectare = ---------- Local Unites

Cooperative /Organization Affiliations (which household members?)

_____

Livestock Holdings (20 Minutes)

Questions	Notes
What types of livestock do you currently own? What is the approximate weight of the animals? What is the dominant breed?	Explain to the HHs the livestock categories and age group terminologies used Only inquire about types of livestock that are relevant to the area . Try to specify local breeds if possible. In the event that HH does not know or cannot estimate the weight of his/her animals consult secondary sources such as literature or local extension staff. The Domestic Animal Diversity Information System has an inventory of livestock breeds at dad.fao.org which may be useful in determining livestock weights.

Type of Livestock	# Currently Owned	Approx.weight per animal(kg)	Dominant Breed
Local Dairy cows – lactating			
Local Dairy cows - non lactating (dry)			
Local Dairy heifers (>6mths old - < 1st calving)			
LocalDairycalves(<6mthsold)–female			
Local Dairy calves (<6mths old) – male			
Improved dairy cows – lactating			
Improved dairy cows - non lactating (dry)			
ImprovedDairyheifers(>6mthsold-<1st calving)			
Improved Dairy calves (<6mths old) – female			
Camel (Male)			
Camel (Female)			
Poultry			

Type of Livestock	# Currently Owned	Approx.weight per animal(kg)	Dominant Breed
ImprovedDairycalves(<6mthsold)–male			
Bulls or castrated male cattle (> 2 year)			
Bullsorcastratedmalecattle(>6mthsold-< 2 years)			
Sheep			
Goats			
Poultry			

Type of Livestock	# Currently Owned	Approx.weight per animal(kg)	Dominant Breed
Camels			

Donkeys			

Crops Grown on Farm (10 Minutes)

Questions	Notes
What crops are grown on your farm? How much would you normally expect these areas to yield (in local units)? What do you do with the residue material (as a percentage)?	*EXCLUDE CROPS GROWN SOLELY FOR FODDER PRODUCTION*. WE WILL COLLECT DETAILS FOR THOSE CROPS LATER If residue material is fed to livestock, obtain an estimate of grain yield from the farmer. If the farmer cannot provide estimate of grain yield the crop residue material will not count as contributing to the diet of the animal.

Cultivation Area & Yield (if using local units, specify below)			Residue Use (%) (if any allocated to 'other', specify below)				
Crop	Area	Yield	Feeding	Burnt	Mulching	Sold	Other*

Name of the local unit (Area) _____ 1 hectare =_____ Local Units

Name of the local unit (Area) _____ 1 Tone = _____ Local Units

*Specify "Other" Residue Use:*_____

Cultivated Fodder (5 Minutes)

Questions	Notes
What plants (including deliberately planted forage trees) are deliberately grown on your farm for the primary purpose of feeding livestock? How much area is used to grow these crops?	oFodder crops are plants that are specifically grown for livestock feeding

Crop	Area

Name of the local unit (Area) _____ 1 hectare =_____ Local Units

Collected Fodder (4 Minutes)

Questions	Notes

Do you collect any other naturally occurring green fodder material from surrounding areas? If so, how much does this material contribute to the total nutrition of your livestock (as a percentage)?	Naturally occurring green fodder can include: Thinnings, Weeds from cropping areas, Roadside weeds, Naturally occurring grasses Any other naturally occurring green material collected for livestock feed

Contribution of collected fodder to animals' diet (%):_____

Purchased Feed (5 Minutes)

Questions	Notes
What feeds do you purchase over a typical 12 month period? What is the price of these feeds? How much do you purchase (in kilograms) each time you purchase the feed? How many times throughout the year do you purchase each feed?	Feeds can include: Crop residues, Green fodder, Commercially available mixed concentrate feeds, Industrial by-products Any other material that is purchased for the purpose of livestock feed.

Feeds Purchased	Price / Local Unit	Typical Quantity per Purchase	Number of Times Purchased per Year

Name of local unit (Mass):_____ 1 Local Unites = _____ Kilograms

Local Currency:_____

Grazing (5 Minutes)

Questions
Considering everything eaten by livestock (eg. crop residues, roadside grasses cut and bought back to animal, grown fodder material, purchased feed), how much does grazing contribute to the overall nutrition of livestock over the course of a year (as a percentage)?

Contribution of grazing to animals' nutrition (%):_____

Sources of Household Income(8 Minutes)

Questions	Notes
From the list given, what are the four main sources of household income? What percentage (%) of household income do each of these sources contribute?	Percentages for all sources must add up to 100%

Income Source (Select 4)	Contribution to Income (%)
Cash crops	
Dairying	
Fattening animals – cattle	
Fattening animals-sheep and goats	
Food crops	
Laboring/service	

Off- farm business	
Poultry (eggs)	
Poultry (meat)	
Remittances	
Dairy Camel	
Camel	
Other (Specify)	
Must add up to 100%	100

Cattle Sales by Category (per Household) (5 Minutes)

Questions
How many ruminants (cattle, sheep, goats) have been sold (or slaughtered for home consumption) over the past 3 years? What was the approximate weight of the animals sold?

Type of Livestock	# of Males Sold	Approx. weight per male (kg)	# of Females Sold	Approx. weight per female (kg)
Number of Camels sold over past 3 year				
Number of cattle sold over past 3 years				
Number of goats sold over past 3 years				
Number of sheep sold over past 3 years				

Sale Price of Livestock (10 Minutes)

Questions	Notes
What is the average price in local currency received for livestock throughout a year?	If respondent has trouble determining an average price for cattle, ask for them to imagine a 400kg fattened castrated male, and how much would that be worth at different periods in the year. If respondent has trouble determining an average price for sheep or goats. Ask them to imagine a 30kg fattened castrated male, and how much would that be worth at different periods in the year?

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Market price for cattle (per head)												
Market price for sheep (per head)												
Market price for goats (per head)												
Market price for Camel (per head)												

Milk Yield, Home Consumption and Sales (10 Minutes)

Questions	Notes

What is the average milk yield in liters per day over the course of a year? What is the average price received per liters of milk over the course of a year? How much milk is retained for household consumption per day?	If household consumption is fairly consistent over the course of a year, it is not necessary to estimate monthly variances.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Total average milk yield (litres/day)												
Average price received for milk (per litre)												
Amount of milk retained for household use (litres/days)												

Seasonality (15 Minutes)

Questions	Notes
On a scale of 0-10, where 10 = excess feed available, 5= adequate feed available and 0=no feed available, how does the availability of feed vary over an average year? How much does each source of feed contribute to the diet of the animals throughout a year? (Proportion of nutrition derived from different sources)	To make this section quicker and easier for respondents, show them their responses on the chart as they are answering, to allow them to visualize trends.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Feed availability (score 0-10)												

Sources of Feed by Month (rate on a scale of 1-10, total for all sources for each month must add up to 10)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Crop residues (eg. Rice straw, maize stover)												
Legume crop residues from legume crops (eg. chickpeas, lentils)												
Green forage (eg. roadside weeds, cut fodder crops, tree leaves etc)												
Grazing												
Concentrates (eg. Wheat bran, grains, oilseed cakes)												
Other – Specify												
	10	10	10	10	10	10	10	10	10	10	10	10

Feed/Fodder questions: For producers/Farmers (Focused Group Discussion)

1. Production

1.1. What is the source of feed for your animals? ----------
1.2. Do you produce feed? 1/ Yes 2/No
1.3. What types of feed do you produce? ----------
1.4. Area of land used for forage production---------- ha
1.5. For what purpose do you produce forage crops? ----------
1.6. Do you use crop residues to feed your animals? ----------
1.7. What are the major constraints in forage production in order of their priority and suggested solutions?

Major constraints	Rank (1= high priority, 3=low priority)	Suggested solutions

1.8. What are the potential opportunities in forage production? ----------
---

2. Inputs used for forage production

2.1. What are the major inputs (seed, fertilizer, etc) for forage production? ----------
2.2. Sources of inputs:----------
2.3. Do you get feed market information? 1/ Yes 2/No
2.4. If yes, who is your source of market information? ----------
2.5. What are the major constraints in forage input supply in order of their priority and suggested solutions?

Major constraints	Rank (1= high priority, 3=low priority)	Suggested solutions

3. Marketing

3.1. Do you sell forage? 1/ Yes 2/No
3.2. What types of forage do you sell? ----------
3.3. To whom do you sell? ----------
3.4. Where do you sell forages? ----------
3.5. Do you buy forage? ----------
3.6. What types of forage do you buy? ----------
3.7. From whom do you usually buy forage? ----------
3.8. Where do you buy forage? ----------

3.9. How do you transport forage? ----------
3.10. Cost of transportation from your area to the market? ----------
3.11. Do you sell crop residues? 1/ Yes 2/No
3.12. What proportion of your crop residues do you sell? ----------
3.13. Do you buy concentrate feed for your animals? 1/ Yes 2/No
3.14. From where do you buy concentrate feeds? ----------
3.15. From whom do you usually buy concentrate feed? ----------
3.16. For what purpose do you buy concentrate feeds? ----------

3.17. To which animals do you provide concentrate feeds and other supplementary forages?

Types of forage	Types of animals									
	oxen	cows	heifers	bulls	calves	sheep	goat	donkeys	Horses & mules	Camel
Crop residues										
Hay										
Cultivated forages(Green maize or Sorghum)										
Cultivated forages(Improved)										
Concentrate feeds										
Others Specify										

3.18. What are the major constraints in forage/feed marketing in order of their priority?

Major constraints	Rank (1= high priority, 3=low priority)	Suggested solutions

3.19. What are the potential opportunities in forage marketing? ----------
---

3.20. When do you usually buy feeds

Types of forage	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Crop residues												
Hay												
Green cultivated forage												
Concentrate feeds												

3.21. At what time do you sell crop residues and other forages?

Types of forage	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Crop residues												

Hay												
Green cultivated forage												
Other forages												

3.22. What is the selling price of the different feed items?

Feed type	Unit	Price per unit in respective months											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec

4. Linkages

4.1. Do you have a group/association/ cooperative for forage production/sell? 1/ Yes 2/No

4.2. What is the role of cooperative/associations in forage input supply and product marketing? ----------
---

4.3. Do you have long standing customers (buyers) for forage? 1/ Yes 2/No

4.4. Who usually determines price for forages/concentrate feeds in the market? ----------

4.5. How do you evaluate the bargaining power of farmers (producers) in forage/feed markets?
Forage: ----------
Concentrate feed: ----------

4.6. What market regulations are impeding your forage/feed marketing? ----------
---

4.7. What market regulations should be in place to facilitate your feed marketing? ----------
---

4.8. Do you mix different feed ingredients? 1/ Yes 2/No

4.9. Have you obtained training on ration formulation? 1/ Yes 2/No Source of training? ----------
---

SURVEY INSTRUMENT FOR TRADERS

Commodity: Feed
Country---------- Region ---------- District---------- Kebele ----------
Name of the respondent_____ Tel: _____
Type of business: 1) Wholesaler 2) Retailer 3) Processor 4) Transporter

1. Buying activities –Quantity of feed bought per month in the following seasons and average price of feed bought and transaction relations:
Type of Feed _____

Season	Total Quantity bought (quintal)	Seller (Codes)	Price paid (Birr/ Quintal	Relation to seller (Code)	Transaction frequency with seller (Code	Where bought (Name of origin market or town)	Mode of payment (code)
Dry							

Season	Total Quantity bought (quintal)	Seller (Codes)	Price paid (Birr/ Quintal	Relation to seller (Code)	Transaction frequency with seller (Code	Where bought (Name of origin market or town)	Mode of payment (code)
Season							
Rainy Season							

Code:

Feed bought: (Code)	Bought from whom (Seller) Code	Mode of payment (Code)	Relation to seller (Code)	Frequency of transactions (Code)
1.Crop residues	1. Farmer 2. Collector	1. On cash, 2. Credit 3. Both	1. No relation	1. One time customer
2.Hay	3. Small Trader 4. Big trader		2. Acquaintance	2. Relatively new customer
3.Cultivated forages (green maize or Sorghum	5. Farmer groups		3. Friend	3. Long standing customer
4.Cultivated forages (improved)	6 Cooperatives 7..Others (specify)		4. Relative	
5. Concentrate feeds			5. Clan group	
6. Others Specify				

2. Selling activities – Quantity of feed Sold per month in the following seasons, average price of feed sold and transaction relations:

Type of Feed (Code) _____

Season	Total quantity sold (Quintal)	Buyer (Codes)	Price received (Birr/ Quintal animal)	Relation to buyer (Code)	Transaction frequency with buyer (Code)	Quantity of feed wasted after transporting	Where sold	Mode of payment (code)
Dry Season								
Rainy Season								

Code:-

Feed Sold	Sold to whom (buyer)	Mode of payment	Relation to buyer	Transactions frequency
1.Crop residues	1. Farmer 2. Government	1. On cash	1. No relation	1. One time customer

2.Hay	3. NGOs 4. Small traders 5. Big trader	2. Credit	2. Acquaintance	2. Relatively new customer
3.Cultivated forages (green maize or Sorghum etc)	6. Fattening enterprises 7. Farmer groups	3. Both	3. Friend	3. Long standing customer
4.Cultivated forages (improved)	8. Cooperatives 9. Livestock traders		4. Relative	
5. Concentrate foods	10. Urban diary 11. Others specify			
6. Others Specify				

Check List for <u>discussion with seed suppliers , cooperatives, union and enterprises, Government and NGOs</u>

1. Socio/economic and environmental general context for each Community , district, Zone and Regional Bureaus
2. Characteristics of target households under the project
3. List and Mapping of the livelihoods and feed resources in each Kebele/ woreda
4. Quantity produced, quantity for self-consumption and quantity sold for each key product
5. Economics exchange in the area: products outgoing (destination and quantity) and products entering (origins and quantity)
6. Existing markets for each key products and stakeholders involved (producers, input suppliers, collectors, transformation agents, local/regional/national/international markets,).
7. Ranking of key assets

Challenges and opportunities

- Production
- Market Access/Input
- Supply/Management
- and Organization/governance
- policy
- Finance_
- infrastructure others

Intervention ----------
Challenges _____
Opportunity _____
Coping /Solution/strategies_____
Recommendations _____
Actions _____