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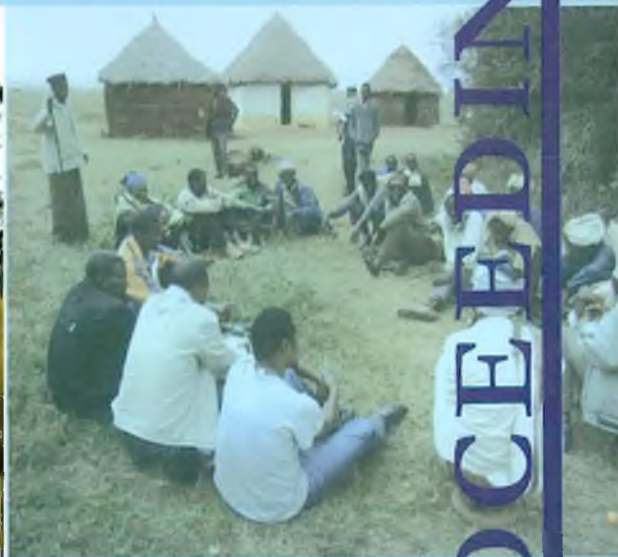


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## PROCEEDING OF 'RESEARCH FOR ENHANCING PASTORALISTS LIVELIHOOD THROUGH RESILIENCE AND MARKET EXPANSION'

# PROCEEDINGS



Haramaya University, 2016



# USAID

FROM THE AMERICAN PEOPLE



**PROCEEDING OF RESEARCH FOR ENHANCING  
PASTORALISTS LIVELIHOOD THROUGH RESILIENCE AND  
MARKET EXPANSION**

**Haramaya University: Pastoralist Areas Resilience Improvement through Market  
Expansion (HU-PRIME) Project Activities, Vol. 1**

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Haramaya University, 2016

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“This study and proceeding is made possible by the generous support of the American people through the United States Agency for International Development (USAID) under the Feed the Future initiative. The contents are the responsibility of authors and do not necessarily reflect the views of USAID or the United States Government or Haramaya University.”

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Printed in the Addis Ababa, Ethiopia

**Registered in National Archives and Library of Ethiopia**

**ISBN-978-99944-949-3-4**

All inquiries should be addressed to the Publisher:

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P.O.Box 138, Dire Dawa, Ethiopia  
Tel: +251-255-530084  
Fax: +251-255-530102  
[www.haramaya.edu.et](http://www.haramaya.edu.et)

Graphics Designer and formatting: Kidesena Sebesibe

**This publication should be sited as**

Mulugeta Getu, Tesfaheywet Zeryehun, Kibebew Kibret, Kassahun Mamo and Habtamu Hailemeskel (Eds.) (2016). PROCEEDING OF RESEARCH FOR ENHANCING PASTORALISTS LIVELIHOOD THROUGH RESILIENCE AND MARKET EXPANSION: *Haramaya University: Pastoralist Areas Resilience Improvement through Market Expansion (HU-PRIME) Project Activities, 2016*, Vol. 1, Haramaya University, Ethiopia.

<b>Table of Contents</b>		<b>Page No</b>
<b>1</b>	<b>Preface</b>	<b>Vi</b>
<b>2</b>	<b>Acronyms</b>	<b>Vii</b>
<b>3</b>	<b>Preliminary Milk Quality and Milk Handling Practice Assessment in Selected Parts of Ethiopian Somali Regional State</b> Fitsum Alemaychu, Tesfaheywet Zeryehun and Ahemed Ismail	<b>1</b>
<b>4</b>	<b>Challenges and Opportunities for Creating Efficient Milk Marketing Chains for Afar, Ethiopian Somali and Borena Pastoralists</b> Desalegn Amlaku, Workneh Kassa and Negassi Ameha	<b>11</b>
<b>5</b>	<b>Gap Analysis in the Production and Dissemination of Animal Health Education Materials in Selected Pastoral and Agro-Pastoral Parts of Afar, Somali and Oromia</b> Tesfaheywet Zeryehun, Fitsum Alemaychu, Degu Worku and Ahemed Ismail	<b>23</b>
<b>6</b>	<b>Marketing Systems of Veterinary Drugs in Selected Pastoral and Agro-Pastoral Parts of Ethiopia: Challenges and Opportunities</b> Workneh Kassa, Desalegn Amlaku and Fasika Kenea	<b>43</b>
<b>7</b>	<b>Climate Change Related Hazards, Traditional Early Warning Indicators and User Climate Forecast Information Requirement in Afar, Oromia, and Ethiopian Somali Pastoralists</b> Lemma Zemedu and Bewket Amdu	<b>57</b>
<b>8</b>	<b>Carbon Stock of Selected Grazing Systems of Afar, Oromia and Ethiopian Somali Pastoral Areas</b> Kibebew Kibret and Tessema Toru	<b>73</b>
<b>9</b>	<b>Energy Efficient Stoves for Pastoral Community: Evidence from Market and Production Systems in Afar, Oromia and Ethiopian Somali Pastoralists</b> Kassahun Mamo and Mohammednur Ahmed	<b>95</b>
<b>10</b>	<b>Micro Insurance Market as a Coping Strategy to Different Environmental Shocks in Pastoral Areas: Prospects and Challenges</b> Workneh Kassa, Desalegn Amlaku, Kassahun Mamo and Mulugeta Getu	<b>115</b>
<b>11</b>	<b>Inclusive Financial Services in Pastoral Areas of Southern Oromia, Afar, and Ethiopian Somali Regions: Opportunities, Implementation Challenges, and Prospects</b> Abebe Ambachew, Kassahun Mam, Jemal Mohammed and Wudassie Ayele	<b>131</b>

12	<b>Policy Research on Cross-Border Trade: Challenges and Prospects</b> Habtamu Hailemeskel, Jemal Mohammed, Ashenafi Negash and Mulugeta Getu	151
13	<b>Potentials of Apiculture as Alternative Livelihood in Pastoral and Agro-Pastoral Areas of Guji and Borena Zones of Oromia Regional State</b> Abche Ambachew and Lemma Zemedu	173
14	<b>Production Potential, Opportunities and Challenges of Fishery Practices in Guji and Liben Zones, Southern Ethiopia</b> Kassahun Mamo and Robson Mekonnin	191
15	<b>Photo Gallery</b>	205

## PREFACE

Haramaya University's (HU) involvement in training, research, and community engagement has increased over the years since its establishment in 1954. To enable it reach more communities and conduct problem solving and tailored research activities, HU has created partnerships with other institutions and projects in different areas. Under the coordination of its College of Law, HU is one of the many partners implementing Pastoralist Areas Resiliency Improvement through Market Expansion (PRIME) Project, a five years USAID funded program working in three pastoralist areas of the country: Afar (Zone 3 – also called Afar Cluster), Ethiopian Somali (Siti, Fafan, Jerer and Liben zones – also called Eastern Cluster), and Oromia (Borana and Guji zones – also called Southern Cluster). Haramaya University serves as Research and Development (R&D) and policy advisory arm of the project. Accordingly, it has conducted more than thirty (30) interdisciplinary and tailored researches and assessments in the last three years, which were basically meant to inform implementation of project activities and provide evidence for policy makers. Yet they offer imperative evidences and recommendations to other stakeholders including government, development partners, business communities, and donors.

Notably, the purpose of the proceeding is to contribute to the accumulated knowledge on pastoral studies and trigger further researches and actions to strengthen the pastoralist livelihood. It could also be used by policy makers, development partners and donors in the design of policy frameworks and future interventions in the area.

This Proceeding provides a representative sample of the breadth and quality of those researches and assessments done on topics very pertinent to pastoralist communities. It includes themes of livestock products and productivity; financial system and alternative livelihood options; and climate change information and coping strategies. The research topics are mostly those recommended by PRIME staff and communities, and further refined by management team and researchers. Sample areas and methodologies for the studies are also discussed with those interest groups. Most of the researches were conducted in 2014 and 2015 and refined over the time.

Principally, the research and assessments were conducted to understand the challenges and prospects, and propose intervention activities pertinent to the pastoralist communities of the three clusters, i.e. PRIME operational areas. Accordingly, field surveys and research findings included in this proceeding were primarily obtained from selected samples of the three clusters. Policy level, marketing and institutional data, however, were obtained from different offices out of the three clusters. The offices are found at Addis Ababa, Semera, Hawassa while the market actors are located in Bishoftu, Dukem, Adam, and Holleta. Though the study areas may not fully represent all the pastoral communities of Ethiopia, they could provide good evidence and recommendations that could be replicated elsewhere.

To validate the outputs and share ideas on how to put the recommendations into practice in specific situations, the project organized series of fora with stakeholders, project staff and local communities in each of the PRIME operational areas. Such were held at Awash Sebat Kilo, Afar on July 9-10, 2015; Jigjiga on September 7-8, 2015; Negelle Borana on October 5-6, 2015; and Yabello on October 8-9, 2015. Participants were drawn from research institutions (Universities and dryland research institutions), government sectoral offices (regional, zonal and district level), business communities (financial institutions, milk processors, and veterinary pharmacies), cooperatives, and development partners

operating in the project areas. After the fora, different discussions were also made with senior project management staff at Addis Ababa on the research outputs

The research outputs were also presented on national and international conferences including the International Conference on Research, Resilience and Innovation (Djibouti, Oct. 26-28, 2015); Association of Ethiopian Micro Finance Institutions (Hawassa, Oct. 2014); 4<sup>th</sup> and 5<sup>th</sup> National Pastoralist Conference of Jigjiga University (Jigjiga, March 2015 & 2016); International Conference on Veterinary Education (Haramaya University, June 2015); and 31<sup>st</sup> and 32<sup>nd</sup> Annual Research Review Workshop of Haramaya University (March 2014 & 2015). Feedbacks obtained from these discussions were used to further enrich the manuscripts and fine-tune the recommendations. This proceeding is a compilation of some of those researches presented and discussed on those national and international conferences and passed through rigorous reviewing processes by experts.

In the process of preparing this proceeding, attention has been given to making it understandable by and usable for all stakeholders including academicians, policy makers and practitioners. Accordingly, whenever needed plain and non-technical languages are preferred, executive summaries are provided and technical matters are further explained. For that, an editorial team of five people drawn from different disciplines were established to manage the whole process. In addition, all the manuscripts were externally reviewed by expert on the areas through double blind-eye review system. An attempt was also made to create uniformity in content and format among all the articles in this manuscript, and set to include Introduction, Methodology, Results and Discussions, Conclusion and Recommendations, and References.

This proceeding came to its current status due to the generous supports provided by different parties. USAID through its PRIME Project covered all the costs for the studies and current publication. All PRIME consortium institutions, Mercy Corps, Care, AISDA, ACPA, HAVOYOCO, SoS Sahel, ECDD, and Kimetrica supported the preparation of this proceeding in various ways. The staff provided their valuable comments in the process of designing and executing the research, and refining the final reports. The communities at the project sites provided us rich data from their accumulated knowledge and experience. The government institutions shared their experience and data. Haramaya University field officers in all the three areas namely Adamu Tefera, Degu Worku and Ahmed Ismael, contributed their best to make the field work for data generation much easier and smoother. We would like to thank all for their enormous contribution to this publication.

Mulugeta Getu, Haramaya University

Project Manager, HU-PRIME Project and Chief Editor

**LIST OF ACRONYMS**

ADLI	Agricultural Development Led Industrialization
AEMFIs	Association of Ethiopian Microfinance Institutions
AFD	Action for Development
AHD	Animal Health Department
AHEM	Animal Health Education Materials
ARD	Agricultural and Rural Development Bureau
CAHWs	Community Based Animal Health Workers
CARE	Cooperative for Assistance and Relief Everywhere
CBE	Commercial Bank of Ethiopia
CBPP	Contagious Bovine Pleuro Pneumonia
CBT	Cross-Border Trade
CCPP	Contagious Caprine Pleuro Pneumonia
CSA	Central Statistics Agency
DPO	Pastoral Development Offices
DPP	Disaster Prevention and Preparedness bureau
EMMA	Emergency Market Mapping Assessment
ENMA	Ethiopian National Meteorology Agency
EPARDA	Ethiopian Pastoral Research and Development Association
ERCA	Ethiopian Revenue and Customs Authority
ETB	Ethiopian Birr
EWS	Early Warning Systems
FAO	Food and Agriculture Organization of the United Nation
FARM-Africa	Food and Agricultural Research Management–Africa
FCA	Federal Cooperative Agency
FDRE	Federal Democratic Republic of Ethiopia
FESs	Fuel Efficient Stoves
FGD	Focus group discussion
FMD	Foot and Mouth Disease
GDP	Gross Domestic Product
GIZ	Gesellschaft für Internationale Zusammenarbeit (German International Cooperation)
GTP	Growth and Transformation Plan
GTZ	Gesellschaft für Technische Zusammenarbeit (German Technical Cooperation)
HU	Haramaya University
IBLI	Index-Based Livestock Insurance
ICBT	Informal Cross Border Trade
IFPRI	International Food Policy Research Institute
ILO	International Labor Organization
ILRI	International Livestock Research Institute
IPCC	Intergovernmental Panel on Climate Change
IR	Intermediate Result
IT	Information Technology
KII	Key Informant Interview
LCRDB	Livestock Crop Rural Development Beuro
LEAD	Leadership for Environment and Development



MFIs	Micro-finance Institutions
MoA	Ministry of Agriculture
MoI	Ministry of Industry
MoRAD	Ministry of Agriculture and Rural Development
MoT	Ministry of Trade
NBE	National Bank of Ethiopia
NGO	Non-Governmental Organization
NLDP	National Livestock Development Project
OCSSC	Oromia Credit and Saving Share Company
OIB	Oromia International Bank
PAs	Peasant Associations
PDO	Pastoral Development Offices
PPCBT	Petty Periphery Cross-Border Trade
PRIME	Pastoralist Resilience Improvement through Market Expansion
PTC	Pastoral training centers
PVPs	Private Veterinary Pharmacies
RuSACCOs	Rural Saving and Credit Cooperatives
SACCOs	Saving and Credit Cooperatives
SWOT	Strength, Weakness, Opportunity, Threat
ToPs	Pastoralists Transitioning out of Pastoralism
UNEP	United Nations Environment Program
VAT	Value Added Tax

## PRELIMINARY MILK QUALITY AND MILK HANDLING PRACTICE ASSESSMENT IN SELECTED PARTS OF ETHIOPIAN SOMALI REGIONAL STATE

Fitsum Alemayehu<sup>1</sup>, Tesfaheywet Zeryehun<sup>1</sup> and Ahemed Ismail<sup>2</sup>

### EXECUTIVE SUMMARY

*A preliminary milk quality assessment was carried out from April to June 2014 in selected part of Somali regional state, Ethiopia. The assessment aimed at diagnosing milk quality problems and identifying existing quality tests in the study area and recommended rapid tests available. The study used staining techniques for the milk smears and cultural and biochemical characteristics for specific identification of pathogens in milk samples collected from different market actors in the value chain. Interactive and brief discussions were made with milk cooperative committee members (pastoralists) and milk collectors to generate valuable data with regard to milk handling practices. The present study revealed that out of the total 70 milk samples taken, none of them proved to be negative for bacterial isolation. The major bacteria isolated include *E. coli*, *Staphylococci* spp. Including *Staphylococcus aureus*, *Streptococci* spp., *Micrococci* spp. and *Bacillus cereus*, *Staphylococcus aureus* was the (77% and 60%) major bacteria isolated from samples from Jigjiga and Kebribeyah respectively. Whereas *E. coli* was the (68%, 63.6% and 57%) major bacteria isolate from samples originating from Fafan, Herdin and Babile respectively.*

*The milk handling practices revealed a serious concern in hygienic operational techniques. Factors that could contribute a lot to the contamination of milk in the study areas include insufficient pre-milking udder preparation, insufficient cleaning of milkers' hands and milking utensils, use of poor quality and non-boiled water for cleaning of udder, milk equipment and storage containers. Additionally, use of plastic containers for handling and transporting of milk increase the risk of contamination of milk higher, since as the number of plastic containers increased the chance of contamination is also increased and most plastic containers have characteristics that make them unsuitable for milk handling. The proximity of milk collection centers to the main roads and lack of good drainage, clean floor, walls and ceilings and lack of cold chain facility from the initial point of production to consumers exposed the milk to contamination by dust particles. Lack of platform tests including alcohol, boiling and lactometer tests at milk collection centers vis-a-vis lack of awareness and training further exacerbates the problem. These can lead to the conclusion that generally the quality of milk at the milk collection centers was substandard.*

*Based on the findings, one may suppose that milk of substandard quality at the milk collections centers may pose a public health risk and this suggests the need for more strict preventive measures. Awareness should be created among dairy cow owner*

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*pastoralists as to the importance of adequate hygienic milking and milk handling practices and consistently use of platform milk tests including lactometer, alcohol and boiling test and use premium payment scheme for good quality milk to encourage hygienic milk handling practices. Collaborative researches should be done with manufacturing enterprises for the design of aluminum and stainless steel containers for milk storage and transport. Further researches should be done to determine the udder health situation in the milking cows. Total Aerobic Plate Count and Coliform counts should be done in the milk collected, containers and water in the study area to identify the bacterial load and to determine the source of contamination*

## 1. INTRODUCTION

Milk and milk products play an important role in human nutrition throughout the world. Consequently, the products must be of high hygienic quality. In less developed areas and especially in hot tropics, high quality of safe product is most important but not easily accomplished (DeGraaf *et al.*, 1997). This is required since milk is also a suitable substrate for microbial growth and development. The fluid or semi-fluid nature of milk and its chemical composition (containing the essential nutrients) renders it one of the ideal culture media for microbial growth and multiplication (Teka, 1997; Gudeta, 1987; Ashenafi and Beyene, 1994; Soomro *et al.*, 2002). Mainly because of this reason, milk and milk products are more prone to harboring and proliferation of microorganisms.

Milk is synthesized in specialized cells of the mammary gland and is virtually sterile when secreted into the alveoli of the udder. Beyond this stage of milk production, microbial contamination can generally occur from three main sources i.e., within the udder, the exterior of the udder and the surface of the milk handling and storage equipment (Murphy, 1996; Godefay and Molla, 2000). Microorganisms may contaminate milk at various stages of milk procurement, processing and distribution. The health of the cow and its environment, improperly cleaned and sanitized milk-handling equipment, and workers who milk cows and been in contact with milk due to a number of reasons could serve as sources of microbial contamination of milk. Use of non-potable water may also cause entry of pathogens into milk. Tropical conditions that have a hot, humid climate for much of the year are ideal for quick milk deterioration also pose particular problems because the temperature is ideal for growth and multiplication of many bacteria (Gilmour, 1999; Godefay and Molla, 2000).

Although milk is known to poses several antimicrobial systems, bacterial numbers will double in less than three hours in un-chilled milk. The rate of microbial growth depends on initial numbers and the temperature at which milk is held after milking and thereafter (Kurwijilla *et al.*, 1992). It is common that contamination of milk during milking and handling can be due to several reasons and mainly related to poor hygiene of the dairy farms, poor milk handling practice, inappropriate transportation and cooling facilities from the point of milk harvesting to its final destination. In most places in Ethiopia, milk is consumed raw. Milk products such as yoghurt, butter and buttermilk are also produced using raw milk as a starting material. Hence, there exists the possibility of consuming milk, contaminated with disease causing organisms (Mehari, 1988).

Diseases that commonly spread from the milk to human beings are tuberculosis, brucellosis, salmonellosis, listeriosis, campylobacteriosis, yersinosis and Q-fever. Other bacterial pathogens transmitted to humans include *Streptococcus agalactiae*, *staphylococcus aureus*, and *Escherchia coli* (Hahn, 1996). Milk may

contain both pathogenic and nonpathogenic organisms. Pathogenic organisms, which may come directly from the cow's udder, are species of *Staphylococcus*, *Streptococcus*, *Mycobacterium*, *Brucella*, *Escherchia*, *Corynebacterium*, etc. Various other pathogenic causing diseases like cholera and typhoid may find access in the milk from various other sources, which may include water, and the persons handling the milk. Nonpathogenic microflora may come directly from the udder and may also enter in the milk from milker's hands, utensils, cow barn, water, etc. (Hahn, 1996).

Understanding the factors affecting the milk quality is critical to success of development and implementation of policies and programs in dairy industry. The current study, therefore, aimed to fulfill this gap by evaluating the milk quality and identifying the factors that determine milk quality at household level.

## 2. METHODOLOGY

### 2.1 .Collection of Milk Samples

Milk samples were collected from morning milk at the dairy cooperative and milk collectors from Eastern cluster including Herdin, Mulu, Babile, Fafan, Jigjiga, Kebribeyah. Fifty milliliter milk was collected from each sampling unit, into sterile containers and after thorough mixing. A total of 70 milk samples were collected from each sampling unit for microbiological analysis as per the procedure described by O'Connor (1995). The samples were transported in icebox to the National Veterinary Institute laboratory for analysis.

### 2.2 . Microbiological Tests

The procedure for isolation and identification of microbe depends on the specific organism in question (Volk and Wheeler, 1980; Carter, 1984; Quinn, 1999). The presence of pathogenic bacteria was confirmed by examination of stained smears, cultural and biochemical characteristics for specific identification. Biochemical identification of most frequently encountered bacteria that cause milk spoilage in the study including *Bacillus cereus*, Coliforms, *Staphylococci* and *Streptococci* was according to Quinn (1999).

### 2.3 . Milk Handling Practice Assessment

Interactive and brief discussions were made with milk cooperative committee members (pastoralists) and milk collectors to generate valuable data with regard to milk handling practices.

## 3. RESULTS AND DISCUSSION

### 3.1 . Microbiological Safety and Quality

Out of the total 70 milk samples taken, none proved to be negative for bacterial isolation. The major bacteria isolated include *E. coli*, *Staphylococci* spp. Including *Staphylococcus aureus*, *Streptococci* spp., *Micrococci* spp. and *Bacillus cereus* (Table 1). *Staphylococcus aureus* was the (77% and 60%) major bacteria isolated in samples from Jigjiga and Kebribeyah respectively. Whereas *E.coli* was the (68%, 63.6% and 57%) major bacterial isolate from samples originating from Fafan, Herdin and Babile respectively. Milk appeared to be severely contaminated with environmental bacterial agents such as *E. coli*. In this study isolation of *Staphylococcus aureus*, *Streptococcus* spp. including *Streptococcus agalactae*, *E. coli* and *Bacillus* spp are incriminated as causes of sub clinical and clinical mastitis in the cow (Harding, 1999). Moreover, *Micrococcus* from milk samples might indicate that these bacterial agents

could probably cause mastitis (Harding, 1999) either being contagious or environmental origin (Bonfroh, 2003).

The contribution of mastitis udder in the bacterial quality of cow milk is an established fact and therefore adequate control of mastitis in the dairy herd is one measure that helps to achieve higher returns to the producer and the processor and to enhance the production of high quality dairy products (Harding, 1999). Commercial pasteurization resulted in the destruction of most common isolates of pathogenic and spoilage bacteria in raw milk.

The type and number of bacteria available in the milk influence the hygienic quality of milk. Those isolates of *Bacillus* spp., *Staphylococcus* spp., *Micrococcus* spp., *Streptococcus* spp. and coliform microorganisms can cause spoilage of the milk when present in raw and pasteurized milk (Doyle, 1997). This may also be of concern for human health since some strains of *S. aureus* and *E.coli* are capable of producing heat stable enterotoxins (Asperger, 1994). *Streptococcus* spp. Including *Streptococcus agalactiae* and *Bacillus cereus* also pose serious public health concern.

#### Description of Isolated Bacteria

*Escherichia coli*: This is frequently contaminating organism and is reliable indicator of fecal pollution generally in sanitary conditions of water, food and milk and other dairying products (Soomroei *al.*, 2002). Recovery of *E.coli* from food is an indicative of possible presence of entero-pathogenic and/or toxigenic microorganisms, which could constitute a public health hazard. *Escherichia coli* is frequently occurring organisms in milk whenever the methods of production, transportation, handling and sale of milk are unhygienic. The milk sold in raw forms poses a great hazard to public health because of possibilities of contamination with *E. coli* (Rea and Fleming, 1994).

Table 1. Type of bacteria isolated from milk samples originating from Eastern Cluster

Sample Origin	No. Samples	Type of bacteria isolated
Herdin	11	<i>E.coli</i> , <i>Bacillus</i> spp., <i>Staphylococcus aureus</i>
Mulu	5	<i>Bacillus</i> spp., <i>Micrococcus</i> spp., <i>E.coli</i> , <i>Staphylococcus aureus</i> , <i>Streptococcus</i> spp.
Babile	7	<i>E.coli</i> , <i>Streptococcus</i> spp., Non pathogenic <i>Staphylococci</i> Spp.
Jigjiga	13	<i>E.coli</i> , <i>Streptococcus</i> spp., Non pathogenic <i>Staphylococci</i> Spp., <i>Staphylococcus aureus</i>
Fafan	19	<i>E.coli</i> , <i>Streptococcus</i> spp., Non pathogenic <i>Staphylococci</i> spp., <i>Staphylococcus aureus</i> , <i>Bacillus</i> spp.
Kebribeyah	15	<i>E.coli</i> , <i>Streptococcus</i> spp., Non pathogenic <i>Staphylococci</i> spp., <i>Staphylococcus aureus</i> , <i>Bacillus</i> spp.

*Staphylococcus aureus*: It is the leading cause of food borne illness throughout the world. Milk and milk products can be contaminated unless good hygiene (including mastitis) control occurs on farms, the milk is adequately pasteurized, and precautions are taken to prevent contamination and subsequent growth of *Staphylococci* during the manufacturing process and the finished product. The pathogenicity of *Staphylococcus aureus* was recognized for many years and it may cause mastitis or skin disease in milk

producing animals or lead to foodborne intoxication in milk and milk products (Asperger, 1994). Human carriers can also contaminate milk. Five serologically distinct enterotoxins (A, B, C, D, and E) are recognized, and enterotoxin "A" is most frequently involved in food poisoning outbreaks. The minimal intoxication dose is 100 nano-gram and sometimes less (Asperger, 1994).

*Streptococcus agalactiae*: Milk born *Streptococcus agalactiae* infections are usually acquired by drinking milk from an infected cow. The organisms enter through the teats and teat canal and cause inflammation of the teats and udder of the cow. The infected cow secretes with the milk viable organisms, which eventually reach the consumers (Becker, 1994; Teka, 1997).

*Streptococcus pyogenes*: This pathogen is directly responsible for a variety of inflammatory and supportive conditions such as sore throat, scarlet fever, cellulitis, erysipelas, impetigo, puerperal sepsis, otitis media, septicemia and wound infections; it is indirectly associated with rheumatic fever, glomerulonephritis and erythema nodosum. It is also found in the throat or nasal cavity in a proportion of apparently healthy carrier people (Collec *et al.*, 1989).

*Micrococcus*: These cocci are gram positive and catalase positive, and some produce pink to orange-red to red pigments, whereas others are non pigmented. Most can grow in the presence of high levels of NaCl, and most are mesotrophs, although psychrotrophic species/ strains are known. It is mostly isolated as a common contaminant of teats.

*Bacillus cereus*: It is a gram positive, aerobic, and catalase-positive bacteria. The optimal growth for this microorganism is obtained at temperatures oscillating between 25 and 75°C, and pH between 6 and 7, even though this microorganism survives temperatures as low as -5°C. The spores are very resistant to heat. At pH lower than 4 the growth of *B. cereus* is inhibited. This species is highly lipolytic, saccharolytic and proteolytic and it is pathogenic for humans. It may be present on milk and dairy products. Only total absence of this species is normally accepted by legal regulations.

### 3.2. Milk Handling Practice

#### 3.2.1. Description of dairy production

The entire respondents included in this study were from the pastoralist livestock production system where only few lactating cows are kept at the homestead. The barn was cleaned irregularly only by removing the feces and rarely with water.

#### 3.2.2. Udder preparation and hygiene

All the respondents (30) used ground water from wells to clean milk equipment and to wet the cows and clean them from soil and dirt. Most of the pastoralists under the study, 95% (27/30) did not have towels for cleaning purposes of cow's udder. Those that had towels, they reuse it for cleaning for all the cows, and hence udder drying is not properly done. Furthermore, most of the milking personnel 76% (23/30) did not wash their hands before milking and between cows, which could be additional sources of contamination for milk. Galton *et al.* (1986) reported that pre-milking udder preparations play an important part in the contamination of milk during milking. The use of detergents for cleaning of milk equipment was not a common practice in the study areas. Hot water that is indispensable for cleaning milking equipment was not available in all the respondent pastoralists' condition, which also is high risk for contamination of milk.

### 3.2.3. *Milking technique, milk containers and transport*

All dairy cow owners milk their cows by hand and none cooled the milk. They simply supply it to their nearest milk collection center of the association's two times a day (morning and evening). All the pastoralists included in this study had plastic containers for milking and transporting the milk to collection centers. The morning and evening milk collected at the collection centers was delivered without cooling and in plastic containers, by donkeys, camels and sometimes on women's back, for about 30 minutes journey to Kerbribeyah and up to three hours to Bombas. At the level of the milk collection centers, soft plastic materials which were not washed and improperly handled were used to tighten the lid covers of the milk collection containers. All the plastic containers used were cleaned improperly and in most cases were smoked and sun dried. Few respondents in Jigjiga and Kebribeyah mentioned that they use stone pebbles and detergents to wash plastic Jerry cans, which may lead to insufficient cleaning and hence could serve as a major cause of milk contamination. In some locations like Bombas and Fafan, even though the respondents were aware of the problem of using plastic containers and in fact do have aluminum containers, but they still use plastic containers due to the comparative advantage of plastic containers to be tightly closed and easily transported to aluminum containers.

### 3.2.4. *Location and function of milk collection centers*

In almost all visited areas, the milk collection centers were located along roadsides, which could likely expose the milk to dust contamination created by moving vehicles and animals. They do not have good drainage, clean floor, walls and ceilings. The milk collection sites were not neat, clean and free from harborages of breeding sites of insects and particularly house flies. In all the milk collection sites, there was no artificial cooling mechanism (refrigeration) even though some of the milk collection centers located in the Fafan and Mulu do have refrigerators. In addition to the conditions explained above, contamination of milk is likely to occur due to lack of cold chain, use of milk containers lacking tight sealing, handling of milk with unclean hands and utensils and proximity of collection centers to roads. Further contamination might have occurred as milk is transported to the processing plant without any cold chain facility and using containers, which were not airtight.

Milk cooperative at the milk collection centers in Jigjiga, Fafan, and Muluhada Coop legal personality, whereas the business was done at an individual level. The truck they use in common to transport milk to main cities including Jigjiga and Awash is the only thing they share in common, otherwise working capital and cost/benefit of the business was owned individually. This resulted in unavailability of organized effort to secure milk quality.

Factors that could contribute a lot to the contamination of milk in this study include: insufficient pre-milking udder preparation, insufficient cleaning of milking personnel hands and milking utensils, use of poor quality and non-boiled water for cleaning of udder, milk equipment, and storage containers. Furthermore, lack of cold chain facility from the initial point of production to consumers is the other factor the increase probability of milk spoilage.

Since plastic containers scratch easily and provide hiding places for bacteria during cleaning and sanitization, and plastic containers are poor conductor of heat and hence will hinder effective sanitization by heat (Shalo, 1990).

### 3.2.5. Pretesting for milk quality

Testing of milk is not a usual practiced in all the milk collection centers. If done, most of the platform tests done are organoleptic tests (using visual, smell and taste). In some cases at the level of restaurants and small-scale milk processors, boiling tests and lactodensimeter are used for checking spoilage and adulteration in Jigjiga and Awash respectively. Some of the milk cooperatives (Fafan and Mulu) do have the facilities to test the milk including lactometer but they do not practice testing due to either poor awareness or no premium payment for good quality milk.

## 4. CONCLUSION AND RECOMMENDATIONS

Milk intended for human consumption must be free from pathogens and must contain no or few bacteria. Clean milk could only be obtained if effective sanitary measures are taken starting from the point of milk is withdrawn from the cow until it reaches the consumers. The shelf life of milk, be it raw or pasteurized, is only increased if the total microbial load in the milk is low at the start of critical points. In line with this fact, the quality of milk produced and channeled to the milk collection centers from the pastoralists dairy was substandard and the health of dairy herd, hygienic conditions of milking and storage processes, transferring of milk into different containers, unclean milk equipment and the use of substandard water were basic determinants of milk quality. Furthermore, the milk was also subjected to more contamination, as it was transported too long distances to the processing plant under high ambient temperature and without cold chain facility and using equipment, which were not airtight. Furthermore, the lack platform tests including alcohol, boiling and lactometer tests *vis-à-vis* the lack of awareness and training further exacerbates the problem. The result of the microbiological analysis clearly demonstrated exogenous sources of milk bacterial contamination. This occurred primary at initial phase of the milking procedure. The poor milk handling practice and the presence of various bacteria in the sampled milk suggested serious public health and zoonotic implication besides the lower keeping quality. Based on the aforementioned reasons, one may suppose that this milk may pose a public health risk and this suggests the need for more strict preventive measures.

Based on the findings of the present study the following recommendations are forwarded:

- Awareness should be created among dairy cow owner as to the importance of adequate udder preparation, hygienic milking technique, use of clean dairy equipment, washing of utensils and milkers hands using properly treated water to improve the milk hygienic quality and shelf life.
- Awareness should also be created among the dairy cooperatives to consistently use platform milk tests including lactometer, alcohol and boiling test
- Introduction of premium payment scheme for good quality milk to encourage hygienic milk handling practices.
- Efficient and practical milk cooling system at affordable price is required not only at the farm level but also at the collection centers and during transportation. Since there is a long time interval between milking and delivery at the collection centers and milk processing plants.
- Raw milk intended for consumption should be subjected to heat treatment at least equivalent to pasteurization temperature.
- If possible, potable water should be available for effective cleaning and sanitizing of milk equipment and udder preparations, otherwise very well heat treated water should be used for such purposes.



- Collaborative researches should be done with manufacturing enterprises for the design of aluminum and stainless steel containers for milk storage and transporting
- Regulation of the dairy development enterprise, establishment of standards and the use of effective enforcement are essential in order to fulfill the consumers' expectations of safe and wholesome milk and milk products
- Further researches should be done to determine the udder health in milking cows, and to determine the total bacterial load and Coliform counts in the milk collected, containers and water in the study area.

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## 6. ACKNOWLEDGMENT

The authors would like to acknowledge the contribution of the field officer in Eastern cluster for facilitation of the fieldwork and the National Veterinary Institute (Bishoftu) for the timely laboratory analysis of milk samples.



## CHALLENGES AND OPPORTUNITIES FOR CREATING EFFICIENT MILK MARKETING CHAINS FOR AFAR, ETHIOPIAN SOMALI AND BORENA PASTORALISTS

Desalegn Amlaku<sup>1</sup>, Workneh Kassa<sup>1</sup> and Negassi Ameha<sup>2</sup>

### EXECUTIVE SUMMERY

*A vibrant dairy sub-sector is important for the economic development of Ethiopia. And milk is one of the most important livestock products among the pastoralists in the three Pastoralists Resilience Improvement through Market Expansion (PRIME) operation clusters; Afar, Eastern and Southern Clusters. Though, the demand for milk and milk products in Ethiopia is increasing, only limited amount of milk is supplied to the market by pastoralists, which would be the most important source of income for pastoralists to ensure their food security. Creating efficient milk marketing chain requires thoroughly analysis of the existing milk marketing chains, identifying the prevailing challenges and opportunities and leverage points.*

*This study revealed that the current milk and milk products marketing chain was characterized by very high seasonality of milk production and marketing with poor marketing practices among milk producers and traders. The majority of sample respondents sell only raw milk whereas only about 19%, 11%, and 30% of the respondent's process milk in Afar, eastern and southern clusters, respectively. Whereas, many of the respondents in Afar cluster (62.5%) indicated that they sell milk products like butter and fermented milk. In terms of access to different milk customers, in Afar cluster, traders were the major customers of pastoralists (75%) whereas little experience of selling milk to cooperatives, processors and directly to consumers. Thirty percent of pastoralists in southern cluster sold milk to traders, cooperatives and consumers. The result of this study indicated that majority (94%) of respondents in Afar cluster didn't know the location of the end market of their milk as well as the price at which the traders sell at the end market. Major milk production occurs during the long rainy season of the respective study area. The seasonality is well reflected by variability on households' average milk sales volume.*

*Sixty eight percent of the sampled respondents used different types of traditional milking equipment across the three clusters instead of hygienic stainless steel/aluminum milking equipment. Among the sampled milk traders across the three clusters, 69% of the respondents use plastic jerry-cans during milk collection and transportation. In southern cluster, the problems were quite worse than other clusters and pastoralists faced milk marketing related problems that could leads to milk spoilage (1.26 times per month), delayed payments by traders (1.50 times per month), loss of money while*

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*sending through informal channels (1.53 times per month), and low price of fermented milk (1.30 times per month). High seasonal variation of milk production, transportation and milk quality problems were indicated in Afar as the second and third ranked problems. In eastern cluster, lower milk price and lack of market access were indicated as the second and third major problems.*

## 1. INTRODUCTION

Ethiopia's pastoral area, which represents approximately 60% of the country's landmass, is a home to 40% of livestock population (CSA, 2008). According to the CSA report female cattle constitute about 58% of the pastoral herd composition of which more than 20% of the female cattle population are milking cattle. About 83% of milk production in Ethiopia comes from cattle, and the remaining 17% comes from goats and camels (MoARD, 2007). It is believed that there is substantial milk production potential in Afar, Eastern, and Southern part of the country.

With the increasing trend in demand for milk and milk products in Ethiopia, improving marketing for milk and milk products can potentially lead to enhanced income generating activities and employment opportunities to pastoralists (Birhanu Kuma *et al.*, 2013). Milk marketing among pastoralists is also left to women where they have exclusive right to sell milk and milk product to obtain modest amounts of cash income. However, the low marketability of milk output due to high transaction costs arising from transportation and high opportunity cost of labor involved poses limitations on the possibilities of exploring distant markets for better prices.

Pastoralists inhabit areas which are constrained with soil fertility, rainfall and temperature conditions. As a result, there are limited options to pastoralists for effective and sustainable land use other than mobile livestock production. In recent years in particular, food security in pastoralist areas is of great concern due to population growth and urbanization which resulted in reduced grazing lands. This is because socio-economic change and climate change coupled with increasing globalization of markets are placing growing pressure upon rangelands; increasing the vulnerability of pastoralist communities (Sadler *et al.*, 2012).

Though pastoralists are generating their income from milk and milk products, the milk product supplied to the market is very limited. In addition, milk collection, processing and marketing are not yet developed to increase pastoralist's income. Lack of access to markets for pastoralists due to their remote location also limits their incentives to supply fresh milk for the market. Absence of modern dairy processing technology in pastoralist areas has limited the value adding option of pastoralists on milk and milk products not only to enhance their income but also to minimize milk spoilage and loss. In general, the existing milk and milk products marketing chains in pastoralist areas are often characterized by poor marketing facilities and services that limit pastoralists' market integration and marketability of their milk products (Land O'Lakes, Inc, 2010)

Creating efficient milk and milk products' marketing chain for pastoralists requires designing interventions by identifying challenges and opportunities in the marketing chain. This also helps to identify feasible leverage areas for policy makers and other major stakeholders. This study is, therefore, aimed to provide new insights by investigating both the challenges and opportunities in the milk marketing chain for pastoralists in the three PRIME clusters.

## 2. METHODOLOGY

This assessment of milk marketing chain was conducted to identify the challenges and opportunities for creating efficient milk marketing chains for pastoralists in the three PRIME clusters (Zone 3 of Afar, Ethiopian Eastern Somali regional state and Borena and Guji zone of Oromia). The field work for the data collection was carried out from January to February, 2015. The study employed both case study and structured survey method to collect important information about major factors that limit marketing chain actors' operating capacities, alternative value adding options and identify challenges and opportunities in creating efficient marketing chain for pastoralists.

The case study method used review of secondary documents including existing project documents and other important background information to examine best experiences and lesson learned in creating milk market linkages. The researchers also used interviews with experts from the agricultural bureaus, cooperative offices, and Non-governmental Organizations (NGOs) in the three clusters. Moreover, the structured survey method was also used to collect primary data from (agro) pastoralists, milk marketing cooperatives, and milk traders. The structured survey questionnaire was administered to 64 milk producers and 32 milk traders (See Table 1). Therefore, a systematic analysis and synthesis of the information obtained from milk producers, traders and experts formed the basis for the results, conclusions and recommendations.

Table 1. Respondents sample sizes from the three PRIME clusters

Cluster	Producers	Traders /Processors	Total
Afar	16	8	24
Eastern	18	9	27
Southern	30	15	45
Total	64	32	96

## 3. RESULTS AND DISCUSSIONS

### 3.1. Household Milk Production and Marketing

Traditionally processed milk products including fermented milk and butter are commonly supplied to the market by pastoralist and reports of Gatwech Tang Dup (2012) and Land O'Lakes Inc. (2010) also showed the same result. To understand the practices of selling processed milk products, sampled milk producing pastoralists were interviewed if they practiced selling of processed milk products. About 19%, 11%, and 30% of the respondents from Afar, eastern and southern cluster, respectively indicated that they sold processed milk products in the form of fermented milk or/and butter made from cow milk (See Table 2).

Table 2. Milk and milk products supplied to market by pastoralists in the study area

Product	Livestock species											
	Camel			Cattle			Sheep			Goat		
	Afar	East	South	Afar	East	South	Afar	East	South	Afar	East	South
Fresh milk	-	+	+	+	+	+	-	-	-	+	-	-
Fermented milk	-	-	-	-	-	+	-	-	-	-	-	-
Butter	-	-	-	+	-	+	-	-	-	-	-	-
Cottage Cheese	-	-	-	-	-	-	-	-	-	-	-	-

(-) not supplied to market (+) supplied to market.

One of the value adding alternatives exercised by pastoralists is raw milk processing into more marketable and high value milk products such as butter, fermented milk (*Ergo*), cottage cheese (*Ayib*) and other milk products, this result is also in agreement with the report of Tegegne *et al.* (2013). However, as Table 2 shows, the practice is limited largely to southern cluster where cow milk is used for both butter and fermented milk production. This may mean that pastoralists have very few milk left from their daily consumption for further processing. This is in agreement with a previous report (Abebe *et al.*, 2014). As it is indicated in Table 3, the majority of sampled pastoralists had no indigenous technologies to process milk, and information about the price level of processed milk products. As compared to the knowledge of indigenous technologies and price of processed milk, relatively higher numbers of pastoralists were aware of the benefit of milk processing for better income.

Table 3. Pastoralists' awareness on issues related to milk processing

Item	Afar N=16		Eastern N=18		Southern N=30	
	Aware	Not aware	Aware	Not aware	Aware	Not aware
	Indigenous technologies to process milk	1	15 (94%)	12	6 (33.3%)	11
Price of processed milk products	0	16 (100%)	0	18 (100%)	5	25 (83%)
Benefit of processing milk for better income	5	11(69%)	10	8 (44.4%)	9	21 (70%)

With regard to milk traders, many of the respondents in Afar cluster (62.5%) indicated that they practiced selling of milk products particularly butter and fermented milk. Whereas majority of milk traders in southern cluster indicated that they didn't sell processed milk products, which is in agreement with Kedija Hussein *et al.* (2008). They rather supply raw milk to urban milk traders (See Table 4). This might be due to the fact that many of Afar and Eastern cluster milk trader respondents resided relatively in urban or peri-urban areas. This indicated that access to urban market was the important determining factor in selling processed milk products. Thus, traders that didn't have access to urban milk markets were compelled to sell raw milk.

Table 4. Milk trades and milk processing in the study area.

Cluster	Apart from raw fresh milk, do you sell processed milk products?				
	Yes		No		Total
	Frequency	%	Frequency	%	Frequency
Afar	5	62.5	3	37.5	8
Eastern	4	50	4	50	9
Southern	5	33	10	67	15

To assess the level of pastoralists' access to the different milk market outlets, they were asked to indicate for whom they sell their milk. In Afar cluster, traders were the major customers of pastoralists (75%) whilst little experience of selling milk to cooperatives, processors and directly to consumers. This is in agreement with Land O'Lakes Inc. (2010). In southern cluster significant number (30%) of pastoralists used multiple milk marketing channels, sold milk to traders, cooperatives and consumers.

Table 5. Customers of pastoralists in the milk marketing chain

Cluster	Milk customers						
	Traders	Processors	Cooperatives	Consumers	Local restaurants	More than one	Total
Afar	12 (75%)	0	0	0	3 (19%)	1 (6%)	16
Eastern	5 (27%)	3 (17%)	2 (11%)	4 (22%)	1 (6%)	3(16%)	18
Southern	10 (33%)	0	5 (17%)	6 (20%)	0	9(30%)	30

Milk traders were also asked about their milk customers (or to whom they sell the milk and milk products). Many of the traders replied that their primary customers were individual customers with response rate of 75%, 44% and 27% in Afar, eastern and southern clusters, respectively. It was also worth noting that 25% and 39% of the traders got multiple customers including other traders, consumers and local business in Afar and southern cluster, respectively, but not in Eastern clusters.

Table 6. Customers of traders in milk marketing chain

Cluster	Milk customers				
	Traders/processors	Consumers	Restaurants and hotels	More than one	Total
Afar	0	6 (75%)	0	2 (25 %)	8
Eastern	5 (56%)	4 (44%)	0	0	9
Southern	4 (27%)	4 (27%)	1 (7%)	6 (39%)	15
Total	9	14	1	8	32

In terms of presence of milk marketing, cooperatives and membership of pastoralists to cooperatives, southern and eastern clusters seem to have better access. To this respect, about 76%, 66%, and 32% of pastoralists in southern, eastern and Afar clusters, respectively, indicated that milk marketing cooperatives were available. This is in agreement with Land O'Lakes Inc. (2010). Among the sampled respondents having access to the cooperatives, about 25% and 35% of them in eastern and southern clusters,



respectively, indicated that they were also members of milk marketing cooperatives. No one was a member to the milk marketing cooperatives in Afar among the sampled respondents.

Pastoralists' awareness level about the milk production and marketing chain can be a challenge as well as an opportunity to any interventions for creating efficient milk market chain for pastoralists in the three clusters. To this end, the study tried to understand the sampled respondents' level of awareness regarding the milk marketing chain's end market, price level, advantages of forming cooperatives, milk processing technologies and other relevant issues. The result indicated that majority (94%) of the respondents in Afar cluster did not know the location of the end market of their milk as well as the price at which the traders sell at the end market. In addition to this, 94 % of the respondents in Afar indicated that they lack awareness about indigenous technologies for milk processing and price level of processed dairy products (such as butter) in the market (see Table 7).

Table 7. Pastoralists' awareness about milk channel

	Afar N=16		Eastern N=18		Southern N=30	
	Aware	Not aware	Aware	Not aware	Aware	Not aware
Price at which traders sell milk at end market	1	15	11	7	11	19
Location where traders sell the milk	1	15	15	3	13	17
Benefits of milk marketing cooperatives	2	14	9	9	4	26
Factors that affect hygiene of milk	9	7	14	4	12	18
Indigenous technologies to process milk	1	15	12	6	10	20
Price of processed dairy products	0	16	10	8	7	23

### 3.2. Seasonality of Milk Production and Marketing in the Study Area

According to interviews conducted with experts from agricultural offices and NGOs as well as milk traders in the three clusters, seasonality of milk production was one of the major challenges in establishing sustainable milk marketing chain to pastoralists. Seasonality also had a role for the absence of milk processing plants in the pastoralist areas. This is in agreement with that of Sadler *et al.* (2012). To understand the seasonality of pastoral households' average milk productions and sales, respondents were asked to estimate their respective milk production across four seasons (Figure 1).

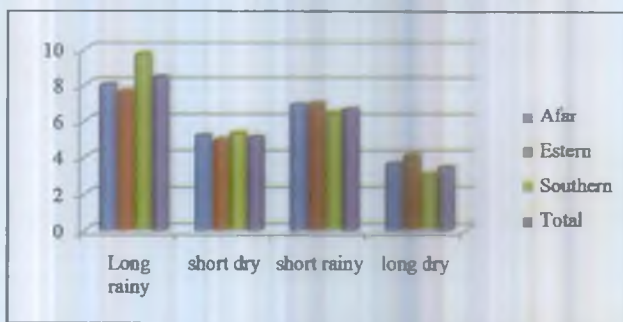


Figure 1. Milk production and marketing across seasons

Pastoralists often sell milk in the market after fulfilling their households' consumption and communal sharing. The result was in agreement with Gatwech Tang Dup.(2012). Although households' amount of milk consumption varies with seasons and number of lactating animals owned, it is usually within the ranges of 25 to 40% of total household milk productions. Not only the milk production and consumption, but also the volume of milk sales exhibits seasonal fluctuations across the three clusters. To this respect, the major milk production occurs during the long rainy season of the respective cluster. The seasonality is well reflected by variability on households' average milk sales volume. The highest (9.7 liter/day during long rainy season) and lowest (3 liter/day during long dry season) average sales volume per household is registered in southern cluster. This might be due to the fact that the major milk product in the cluster is raw cow milk whereas in the Afar and eastern clusters pastoralists' milk product includes camel and goat milks in addition to cow milk. In Afar, pastoralists often sell goat milk, especially during dry seasons, which is not common in other clusters.

### 3.3. Pastoralist milk production and hygiene

The type of equipment used during milking, storage and transpiration influences the hygiene of pastoralists' milk production and marketing. Majority (68%) of the sampled respondent use different types of traditional milking equipment across the three clusters, which is similar to the report of Gatwech Tang Dup, (2012). While 12.5% and 39% of respondents in Afar and Eastern clusters have also indicated that they use stainless steel/aluminum milking equipment, respectively. But during milk storage, there was quite significant improvements in the utilization of stainless steel/aluminum milk containers. In this regard, about 88% of respondents across the three clusters use plastic Jerry cans to transport milk to markets (Figure 2).

Pastoralists might not use the stainless steel/aluminum milk containers since either they have no access to buy the equipment or lacks knowledge about the hygienic benefits of the equipment. To understand pastoralists' knowledge of where the stainless steel/aluminum containers were available for sell, sampled pastoralists were asked about their knowledge as to where to buy the stainless steel/aluminum containers. To this respect, 25%, 17% and 47% of the respondents in Afar, eastern and southern clusters, respectively, had no information as to where to buy the equipment if they want. In each cluster, the researchers of this study also checked the availability of stainless steel/aluminum cans. It was found out that availability of the cans was very limited, especially for the larger ones. The sampled milk traders (69%) across the three clusters mainly use plastic Jerry cans during milk collections and transportations. As compared with milk producers, a higher number of traders (19%) use either steel or aluminum cans. This may be because about 78 % of milk traders had knowledge as to where the steel and aluminum cans are available for purchase (Table 8).

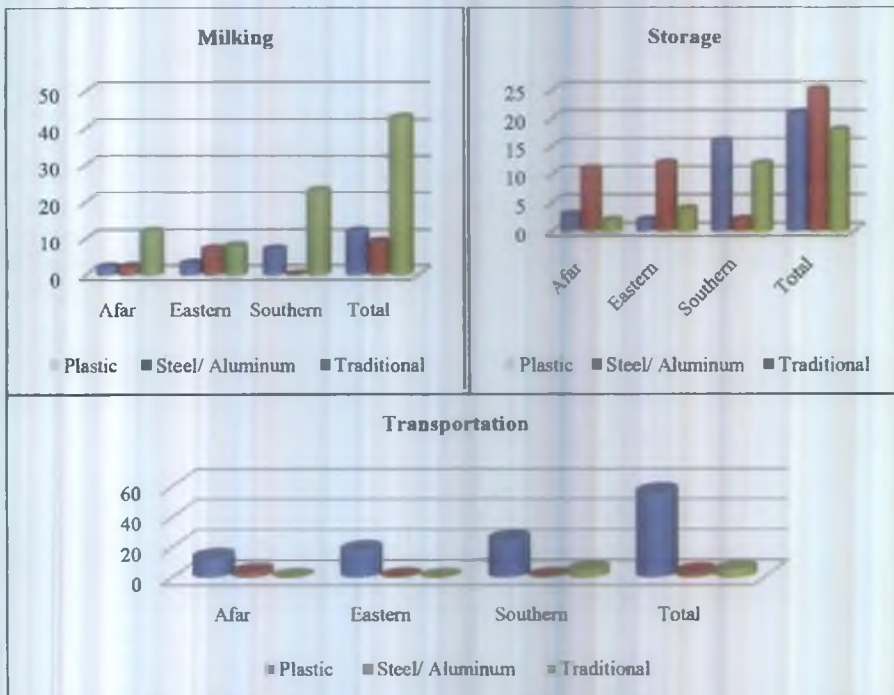


Figure 2. Milk equipment used by pastoralists

Table 8. Milking equipment used by milk traders

Cluster	Equipment used during milk collection				Total
	Plastic Jerry can	Steel can	Aluminum can	Traditional	
Afar	5	1	1	0	8
Eastern	5	1	1	2	9
Southern	12	1	1	1	15
Total	22	3	3	3	32

### 3.4. Challenges and Opportunities in Milk Marketing Chain

The level of milk spoilage was very high in the study areas. As a result, on average milk producers had been facing milk spoilage and loss of milk supplied at rate of 1.14 and 1.08 times in every month, respectively. In southern cluster, pastoralists faced a higher marketing related problems in terms of milk spoilage (1.26 times per month), delayed payments by traders (1.50 times per month), loss of money while sending through informal channels (1.53 times per month), low price of fermented milk (1.30 times per month), milk rejection by customers due to quality problems (once per month), loss of milk supplied to customers (twice per month), milk not supplied due to insecurity (once per month) and lack of buyers (once per month).

Moreover, respondents were asked to mention three major marketing constraints that they usually facing. Accordingly, seasonality of milk production was noted across the three clusters as the major challenge for milk producers (Figure 3). But there were differences across clusters for other milk marketing constraints. Transportation and milk quality problems were indicated in Afar as the second and third major problems. In eastern cluster, lower milk price and lack of market were indicated as the second and third major problems. Finally, in southern cluster, lack of transportation, lack of market as well as milk quality problems were indicated as the second and third major marketing constraints, respectively. Moreover, the study revealed that the provisions of public service like access to livestock health, credit, road and market information was poor in general in the study areas. However, provision of adequate services for the (agro) pastoralist communities can enhance not only the socio-economic development of pastoralists but also improve the efficiency of the milk marketing chain. Therefore, poor provisions of public services in the pastoral area imposed major challenge in the development of dairy sector and milk marketing chain. Many of the samples respondents also mentioned lower milk price and weak existing cooperatives as constraints that deter effective milk marketing in the areas.

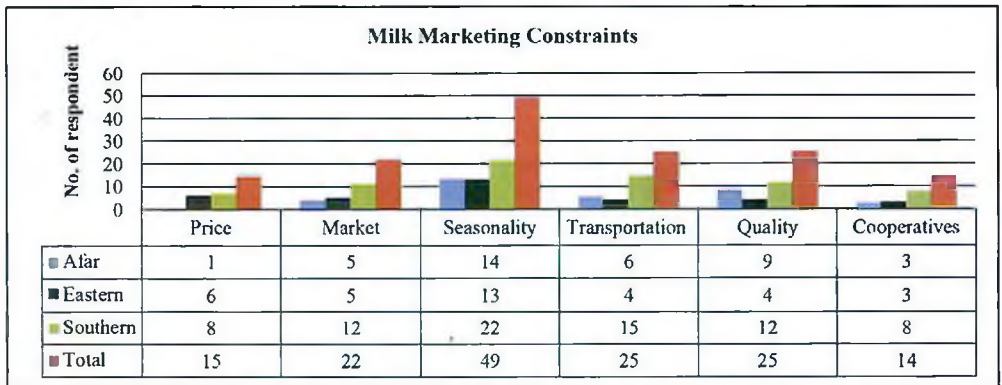


Figure 3. Major constraints affecting pastoralists' milk production and marketing

In terms of required interventions proposed by sampled pastoralists, majority of the respondents in Afar have proposed market linkage facilitations and strengthening of milk cooperatives as main interventions required to create efficient milk marketing chain, and the reports of (Woldemichael Soman, 2008) showed the same result. Whereas, in eastern cluster, sampled pastoralist respondents indicated that they preferred interventions that target on feed development and strengthening of milk cooperatives to improve the milk production and marketing in their area.

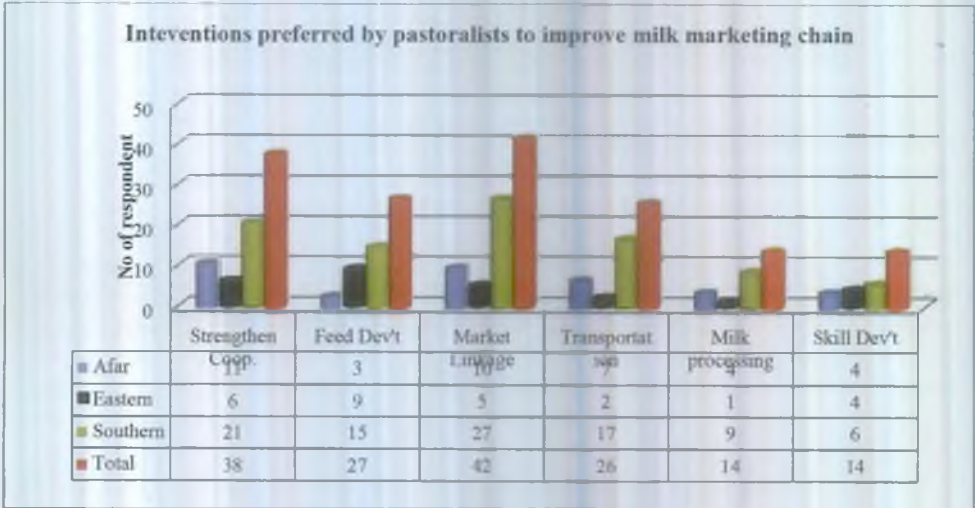


Figure 4. Interventions preferred by pastoralists to improve milk marketing chain

### 3.5. Interventions in Milk Marketing Chain

Planned and relevant interventions by NGOs and other development agents can have positive effect in creating efficient milk marketing chain to pastoralists in the three PRIME clusters. With this understand, respondents were asked regarding any training they have received during the last two years. About 69 % of sampled pastoralists respondents did not receive any training (or awareness creation programs) related to milk production and marketing. This may indicate that pastoralists indeed lack appropriate trainings on milk production and marketing. But 11% and 9% of the respondents in eastern and southern clusters, respectively, indicated that they received animal health and dairy production related trainings.

Currently, only SOS Sahel and Hunde had project activities related with milk marketing chain. SOS Sahel has trade project that focus in strengthening milk trades in southern cluster and Hunde was also working in enhancing alternative income generating activities, including milk marketing for women groups in Yabello area. However, currently they have not yet started interventions that directly target on milk marketing chain. The NGOs that were contacted in this study indicated the following challenges for creating efficient milk marketing chain for pastoralists:

- ◆ Very high seasonal variability of milk production and marketing price;
- ◆ Very low market oriented milk production among pastoralists;
- ◆ Very poor hygiene and sanitation of milk production by pastoralists
- ◆ Low availability and high price of commercial feed;
- ◆ Lack of appropriate milk market infrastructure and supplies (including roads, milk collection centers, market information, transportation vehicles, and hygienic milk cans); and
- ◆ Weak milk marketing cooperatives.

## 4. CONCLUSION AND RECOMMENDATIONS

### 4.1. Conclusion

Milk and milk products have enormous potential to enhance the resilience of pastoralists' livelihood not only by serving as important source of food but also income. However, milk production and milk yield in pastoralist areas were highly influenced by seasonal fluctuations in livestock feed. The milk produced by pastoralists was largely used for food consumption in the household. And hence, pastoralists supply milk and milk products after fulfilling their milk requirements for food.

Currently, milk and milk products marketing chain is often characterized by very high seasonality of milk production and marketing with low level of marketing practices among milk producers and traders. Prevalence of major animal diseases, low feed production and lack of market orientation among milk producers (and other marketing chain actors) were limiting the development of efficient milk marketing chain in pastoralist areas. The infrastructure for milk production and marketing in pastoralist areas were also lacking or limited. Poor milk marketing infrastructure coupled with limited awareness of the milk marketing chain actors' have deterred the development of market oriented dairy production and marketing in the pastoralist areas. Thus, creating efficient milk marketing chains for pastoralists requires critically identifying the major challenges and opportunities which could be the leverage points for further interventions.

### 4.2. Recommendations

Based on the findings of the study, the following recommendations were made to improve the milk marketing chain in the three PRIME clusters.

- ◆ Training and workshops on improved milk hygiene practices
- ◆ Business and marketing skills training.
- ◆ Cooperation in co-financing the use of hygienic milk cans and transportation.
- ◆ Subsidizing the establishment of milk processing plants in pastoralist areas.
- ◆ Improve availability of dry season feeds.
- ◆ Improving local milk market infrastructures.
- ◆ Promoting traditional milk and milk products preservation methods.

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## GAP ANALYSIS IN THE PRODUCTION AND DISSEMINATION OF ANIMAL HEALTH EDUCATION MATERIALS IN SELECTED PASTORAL AND AGRO-PASTORAL PARTS OF AFAR, ETHIOPIAN SOMALI AND OROMIA

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### EXECUTIVE SUMMARY

*The pastoral part of Ethiopia is the potential area for livestock production and the economic benefit that comes out of it. Animal health service provision plays a paramount role in increasing the productivity and boosting the economic return from both the domestic and international market. However, the service delivery is inefficient with respect to the huge demand placed on the sector. This calls upon integrated and coordinated efforts of actors involved in animal health service (both from public and private goods side) to work in a rhythm and in a harmonized manner for a common goal of reducing animal disease prevalence. Among this effort is to increase the awareness of livestock owners and ultimately educating them through several venues such as workshops, trainings, and campaigns etc, accompanied by disseminations of animal health education materials (AHEMs). Nonetheless, in pastoral parts of Ethiopia, for one or more reasons, the function of actors is fragmented and independent to each other and synergy is not part of that process. This assessment was conducted in the three clusters of Pastoralist Areas Resilience Improvement through Market Expansion (PRIME) project operational areas namely, the Eastern Cluster (Fafan Zone: Jijiga, Kebrihbeha and Erer Woreda), Southern Cluster (Borena Zone: Yabello and Moyale Woreda), and Afar Clusters (Zone 3: Fentale and Amibara). The objective of the assessment was to capture the gaps in the production and dissemination of AHEMs and seek possible ways to intervene by doing this activity. The assessment employed desk review, and key informant interviews to gather relevant information. It was found out that although efforts of production and disseminations of AHEMs are going on by the animal health departments, NGOs and very few PVPs in the three regions (Afar, Oromia and Somali) visited, it is being done with less coordination, with no measure of effectiveness and in unsustainable modality and with less participation of the various the livestock owners. Most of the participants in this assessment mentioned that Posters and brochures are more favorable for educating livestock owners. Pastoralists themselves mentioned that on top of posters (75%), messages in audio-visuals formats are more understandable and absorbable. The less participation of PVPs (4%) in the dissemination of AHEMs was an indicator that private practitioners are underutilized for the same purpose although they are pivotal to the animal health service delivery. On the other hand, the active participation of CAHWs (8%) in disseminating AHEMs as equally as the*

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*government is an opportunity to reach out livestock owners with animal health message and there is a good hope that if it is done in a sustainable way it may serve as an instrument of educating the "poor literate" pastoral community.*

## 1. INTRODUCTION

Animal health services are the major felt needs of the pastoral communities, and absence of the same may cripple the very hand that feeds the community. Despite the fact that there are large numbers of livestock populations, the sector's national economic contribution and benefits accruing to the pastoralists in particular through livestock export are quite minimal. Number of constraints impede these outcomes including, limited inputs supply (feed and animal health), limited or poor animal extension services, high disease prevalence, poor marketing infrastructure, vastness of the areas, lack of marketing support services, limited credit services, absence of effective producers' cooperatives and natural resource degradation (Yacob, 2002). The mobile lifestyle of pastoralists over vast areas, high delivery costs, insecurity, poor infrastructure, low cash economy, high cost of service delivery, vastness of the area, lack of veterinary personnel and reluctance among qualified veterinarians to live in remote areas have hampered veterinary service provision for Ethiopia's pastoralists (Gedlu and Gijjs, 1995). Due to inadequate or lack of AHS in pastoral areas, various service delivery initiatives, including CAHWs systems, have emerged as an alternative option (Catley *et al.*, 2002). The initiative was started by NGOs and this system is yet to pass the test of time on sustainability and viability because it was done on voluntary basis, hardly sustainable beyond the lifespan of the supporting projects package CAHWs delivery initiatives within the privatization framework to make them sustainable and economically viable (Charless and Alistair, 2002).

Let alone animal health education, the existing animal health extension services in pastoral and agro-pastoral parts of Ethiopia is, in general, inadequate as it stands. Educating livestock owners requires and should be preceded by a kind of "Adult education" owing to the poor literacy level. Traditionally, extension has been seen as information delivery to farmers (Moris, 1991). Alongside information delivery, training in the use of new technology may be given and as a start, a definition that covers information delivery and training in new technology is adequate. Contemporary literature on extension however includes a third facet, the creation of indigenous institutions that take decisions and allow exchange of information.

The limited impact of extension within the pastoral sector is widely recognized (Moris, 1991; Bonfiglioli, 1992; de Haan, 1993). Attributes commonly found in pastoral environments means that traditional information exchange models are inappropriate for use in a pastoral environment given the complex social characteristics and the very harsh environment they have to deal with every day. General lack of formal education and high levels of illiteracy among pastoralists (Akabwai, 1993) may cause barriers to communicate them about complex issues of animal health. Animal health information passing from the government and sometimes through NGOs to PVPs and pastoralists through workshops, and awareness creation events is the commonest way of animal health extension in pastoral and agro-pastoral areas of most African countries. Nonetheless, materialization of information in the form of animal health education materials (AHEMs) such as posters, brochures, booklets, leaflets, audio-visual aids, etc. was not quite the practice in the country. Human health and nutrition messages accompanied by related education materials have been implemented in Ethiopia and elsewhere with success (Waters-Bayers *et al.*, 2005; FAO, 2011). But the use of AHEMs in animal health education is quite phenomenon theoretically but not

as such implemented with coordination and its impact has not been measured. Furthermore, there is great dearth of information in the use and application of AHEMs in animal health education.

In effort to extend viable and more sustainable animal health services to the pastoralists using economic models to realize the very outcome of improved animal health services in the pastoralist areas and hence improved productivity and market competitiveness, PRIME also has to increase the awareness of livestock owners (pastoralists) themselves by providing animal health information through different mechanisms including among others, by producing and disseminating AHEMs. No program is effective unless the very beneficiaries cooperate with the intervention strategies hence in order to claim their willingness to pay to the services provided to them through the available markets, they must be provided with basic animal health information most importantly through education materials in a way that can be easily understood, assimilated and practiced. The first step to producing appropriate AHEMs is, therefore, to undergo a gap analysis, in the pastoralist setting, to look into previous efforts in animal health education with regard to increasing pastoralists' awareness on issues on and around animal health. Therefore, this assessment seeks to look for gaps in the production and disseminations of AHEMs and aimed to come up with exploration areas to curb those challenges.

#### Impacts of an informed Activities

*In Yabello Woreda only, there were reports of deaths of quite a considerable number of cattle and camels because of application of over dose or administration of drugs through the wrong routs as well as, reliance on traditional herbs for use in the treatment of clinical cases by animal owners. This was the case in the past 2 to 3 years. Even during the assessment we have arrived at a place in Yabello Woreda where 10 camels were in a "dying state" (moribund) because of intramuscular injection of Ivermectin (a drug that should be given subcutaneously). This is claimed to be the impact of less animal health extension services, weak institutional framework to educate livestock owners and very loose connection between the service provider and those who needs the service. Pictorial representation of sites of animal injection and minor wound management vis-a-vis the impacts of the use of un prescribed ways of drug administration depicted in the form of AHEMs including but not limited to posters, banners or models, would have saved the innocents livestock that died for the foolish act of carelessness and inattention.*

*Source: (PDO and observation).*

## 2. METHODOLOGY

This assessment was conducted in the three clusters of Pastoralist Areas Resilience Improvement through Market Expansion (PRIME) project operational areas namely, the Eastern Cluster (Fafan Zone: Jijiga, Kebrihibeya and Erer Woreda), Southern Cluster (Borena Zone: Yabello and Moyale Woreda), and Afar Clusters (Zone 3: Fentale and Amibara). In this assessment individual interview with the heads of different bureaus at the government offices, experts in local and international NGOs from the three PRIME clusters (Afar, eastern and southern) and animal health practitioners such as PVPS and CAHWs, as well as livestock owners (pastoralists and agro-pastoralists) was employed. Face to face interview was conducted with the delegates/representatives of animal health departments in Yabello and Moyalle Woreda Agricultural Bureau and Pastoralists Development Office (PDO) (Oromia Region); Awash Fentale and Amibara (Afar Region) Woreda Agricultural Bureaus; Fafan and Siti Zone Agricultural Bureaus (Somali Region). Moreover, interview was conducted with experts at CARE Ethiopia, Action for Development (AFD), Save the Children, Gayo International, Agri-service Ethiopia, Oxfam Ethiopia

and GOAL Ethiopia. Questionnaire was also designed and administered to 115 pastoralists in the three clusters to learn the status and reachability of AHEMs to the pastoralists. In Addition to that, efforts were made to gather literatures related to the subject treated through an in-depth desk research. Personal observations and triangulations were made to validate the data gathered. Some of the data generated in this assessment are presented in tables and descriptive statistics as part of the analysis.

### 3. RESULTS AND DISCUSSION

#### 3.1. Responses by Agencies Operating in Pastoral Areas

##### 3.1.1. Government agency response

Thus far, there has been relatively little official institutional response in pastoral areas of Ethiopia, as most of the animal health education activities have focused on highland areas where there are better infrastructures.

##### *Efforts in the Production and Dissemination of AHEMs (Southern cluster)*

In 2002-2004 there was a continuous awareness raising campaigns and community sensitization programs organized by the department in collaboration with the National Livestock Development Project (NLDP) for the disease PPR, which imposes a serious threat especially in the Somali region of Ethiopia. Those events included dissemination of the AHEMs including brochures and posters about the disease though in few numbers. In the year 2008, plenty of AHEMs in the form of posters, brochures were produced and disseminated for the most important disease namely, CCPP in collaboration with Action for Contre la Faim (ACF). In year 2007-2010, thousands of posters that came from the Federal Bewro of Agriculture were used to educate CAHWs and pastoralists about Avian flu. The Flu campaign was supported by FAO through the Support Programme to Integrated National Action Plans on Avian and Human Influenza in Africa (SPINAP) project. Some two years back poster and fliers which were prepared to address the issue of transboundary animal diseases (TADs) were used by Animal health assistances to teach those communities that come to animal health posts. In 2012 there was an awareness campaign about rabies (a deadly disease to dogs and humans) twice in the same year during the campaign several posters and pamphlet which depicts pictorial representation of the disease about its transmission, prevention and medical aids were produced and disseminated. In all of the above cases because of poor monitoring and evaluation system as well as Animal health education efforts in the form of training and workshop are the commonest modalities of delivering animal health issues to the CAHWs and PVPs but these modalities are not accompanied with provision of AHEMs due to budget constraints. Furthermore, given the poor literacy level of majority of pastoralists the materials that has been produced by the animal health department are not considered appropriate to the pastoralists. On top of that the poor infrastructures as well as budget constraints made it difficult for the office to reach out pastoralists even through CAHWs and PVPs. The department is currently reviewing its activities and looking for external funds to produce AHEMs which are more appropriate to pastoralist especially in the area of appropriate drug handling, livestock husbandry and animal feeding. The independent and uncoordinated action of the different actors (the government, CAHWs and PVPs) made it difficult to educate animal owners through pooled resources.

Source: (Animal health department, Moyalle Woreda, Agricultural office, Description of the action Vaccines for the Control of Neglected Animal Diseases in Africa (VACNADA), 2010)

**Southern Cluster:** Awareness-raising campaigns are visible in posters, billboards, etc in the large towns in the lowlands, such as Yabello and Moyalle, but there is much less evidence of these in the rural pastoral areas. Woreda-level staffs, especially in animal health education, are trying to raise awareness

about several diseases of public health and economic importance such as tuberculosis, echinococcosis and rabies throughout Ethiopia, including pastoral areas. However, respondents in the animal health departments and pastoralist development offices (PDO) at Yabello and Moyalle Woreda stated that little or no activities were done in terms of educating pastoralists through production and dissemination of AHEMs. At Yabello Woreda so far training of CAHWs was the most consistent activity that is being done in collaboration with the support from NGOs in the area every year. Although efforts were done to produce and disseminate brochures and posters in 2009 to increase awareness about the two most important diseases in the area namely, contagious caprine pleuro pneumonia (CCPP) and coenurosis, however, the coverage was very poor and only those households with good literacy (who received primary cycle education) happened to be the beneficiaries. The pastoralist development officers mentioned that there was also production and dissemination of AHEM to the PVPs in the woreda at several workshops in the form of posters, calendars, and brochures. Nonetheless, the content of the AHEMs is only limited to disease prevention strategies and the materials are used only for the consumption of the PVPs who attended the workshops. In general, in Borena, the PDO representative at Yabello, stated that AHEMs which were produced in the form of posters, brochures, pamphlets, T-shirts and the like were neither directly passed down to the pastoralists nor indirectly through the CAHWs or PVPs.

It was also found out that the common way of educating or passing animal health information to pastoralists was often through campaign and sometimes during workshop. In fact, vaccination campaign was the commonest way of creating awareness to pastoralists about animal health related issues. The respondent forwarded that in the region, until now the coverage for the disseminations of AHEMs is limited to few kebelles which are mostly nearer to the cities. But efforts are underway to have a wider coverage and fair distribution of the AHEMs. Furthermore, there was no any follow up with regard to evaluating the effectiveness of those AHEMs disseminated. The knowledge created because of the awareness creation and "animal health education" through the various AHEMs was not as such visible and despite the seminars and workshops – the pastoralists were not changing their behavior towards disease management and livestock husbandry. Hence, the disease prevalence did not seem to reduce in the woreda.

During the key informant interview with PDO personnel of Moyalle Woreda of Ethiopia Somali Region, a lot of visible efforts were mentioned by the interviewee. The respondents said that the area was suffering from plethora of animal diseases that emanated from poor livestock management as well as transboundary animal diseases. The recurrent drought as well as the poor infrastructures in the region contributed to the less coverage of animal health service to over the thousands of pastoralists that depend solely on livestock and livestock products. Besides the regular yearly refresher trainings to the CAHWs, several workshops and awareness creation campaigns on diseases like Peste-des-Petits Ruminants (PPR), Contagious Caprine Pleuro Pneumonia (CCPP), Avian flu and Rabies have taken place in the area that involves pastoralists and private practitioners including PVPs, through the support of international donors and NGOs. Most of the time, the training materials, brochures and posters produced mainly focused on specific diseases based on records of outbreak or directions received from the Federal Ministry of Agricultural. Although routine activities of advice ("education") has been happenings time and again the appropriateness of some of the AHEMs is questionable given the low access to formal or adult education especially in the more rural pastoralist settings. Moreover, there was no clear guideline or practice used to measure the effectiveness of the AHEMs provided to the target audiences. The poor management at the AHD, the lack of incentives for CAHWs to provide and teach pastoralists what they have learnt in

workshops and trainings through the materials provided, the unwillingness of AHA to go to remote pastoral parts, and the less involvement of PVPs in the animal health education besides selling drugs are the major challenges to cascade down knowledge and skills to the pastoralists. The fact that there are no premium payment to CAHWs and PVPs for quality service and input supply respectively, and the low level of awareness and quite often reluctance to pay for information/services provided to them has complicated the issue of production and dissemination of AHEMs for the big agenda of "Educating" pastoralists.

**Eastern cluster:** In Jijiga Woreda of Fafan Zone the animal health department office indicate that they have done a great deal of activities to "educate" pastoralists through repeated awareness creation program based mainly on radio, as well as the use of posters and leaflets prepared in local languages of the region (Somali) in several of vaccination and disease awareness campaigns. Discussions of educational nature are also not uncommon at the various animal health posts between animal health doctors and/or AHAs, and CAHWs and pastoralists. However, dissemination of appropriate AHEMs to pastoralists and CAHWs never happened in these health posts. Besides the regular refresher training as well as the occasional workshops and specific trainings offered to PVPS and CAHWs in the different Woredas of the Fafan zone, the Animal Health Bureaus mentioned to the assessment team that in year 2012-2014 only more than 3,600 AHEMs in the form of posters and brochures were prepared although these materials were not provided to pastoralists but only to PVPs and CAHWs. The content of the AHEMs were mainly on Foot and Mouth Disease (FMD), PPR, CCPP, CBPP and Brucellosis and very few on the use and application of few drugs like acaricides. The AHEMs provided to CAHWs and PVPs were used to teach pastoralists while providing service. It was explained that there was a lot of report of deaths of animals due to improper utilization of acaricides. However, after the distribution of AHEMs to CAHWs and PVPs there was a remarkable decrease in livestock mortality. Hence its proven worthy to continuously educate animal owners as well as those involved providing inputs and services.

*A New Paradigm in Educating Pastoralists*

*The educational campaign organized by PRIME in year 2014 that focused on selection, utilization, handling and proper storage of high quality vet drugs was mentioned as a new paradigm in educating pastoralists. The educational events were conducted in Kabribayh, Ararso, Dhagahbuur, Gursum, Shintile, Eyshia and Dhenga districts of Fafan, Jarar and Siti zones. The message traversed several pastoralists and was attended by many men and women pastoralists. The activity was praised by many and believed to be one of the best methods to deliver message and thereby educate pastoralists in animal health and related issues. It's favored by the Woreda Livestock, Crop and Rural Development Bureau (LCRDB) other sectors also could organize similar events of educating nature.*

*PRIME had also organized a trade fair in Jijiga town in early 2014 in collaboration with Ethiopian Somali Region Chamber of Commerce and the Somali Regional and LCRDB. The fair was an educational one besides its business linkage orientation. Being attended by hundreds of pastoralists it also created an opportunity to handout some of animal disease curatives and preventive drugs by animal health input suppliers. The LCRDB representative suggested that in the future, those brochures and posters should be produced in languages more appropriate to the area and also should be supported by pictorial representation of the use and application of whatever is displayed to enhance the use of AHEMs far better than before.*

*Source: LCRDB, Jijiga Office, Somali Regional State.*

It was found out that in Ethiopia Somali regional state especially in Jijiga there is an air time on radio program that focuses on animal health and animal feeds. It is said that the program enabled pastoralists to learn about important livestock disease, livestock husbandry as well as animal nutrition. The respondents indicated that it is one of the effective ways to reach out pastoralists who can't be reached through the dissemination of AHEMs on account of poor infrastructure (roads, transport and communication facilities), the mobility of pastoralists as well as conditions like drought and sometimes flood. Furthermore, the limited budget allocated to animal health department for the preparation and dissemination of AHEMs is a great hindrance to reach large number of pastoral households. During the assessment, it was learned that Error and Shinile woredas of Siti zone have neither used any AHEMs, nor do they provide any regular refresher trainings to CAHWs. The livestock and crop rural development Beauro (LCRDB) representative mentioned that these areas are less covered due to poor infrastructures. In fact, the AHD representative mentioned that in general, the low literacy level of pastoralists in the region requires the office to produce materials that possess pictures and diagrams the preparation of which demand huge budget especially to produce it in plenty.

In the region although linkage is created between CAHWs and PVPs but there is lack of follow up of the activities between CAHWs and these PVPs as well as between CAHWs and pastoralists. It was clear during the assessment that there were no cost-sharing activities in the production and disseminations of AHEMs between the government, and PVPs, CAHWs and pastoralists. But the AHD likes the idea of cost-

sharing in the production of AHEMs but they said that it requires further discussion with CAHWs, PVPs and clan elders to look into the "willingness to pay" for the information that will be flowing in the form of AHEMs together with the inputs to be supplied and services rendered.

*Afar Cluster.* In Afar region, the Amibara and Fentale Woreda agricultural offices, more specifically the AHD office responded to that assessment team that production and dissemination of AHEMs to pastoralists has not been the practice of the region. In the region the customary practice to "Educate", rather "inform" pastoralists is through awareness creation campaigns, and during mobilization of CAHWs, PVP owners and pastoralists during vaccination campaigns. One animal health officer at Fentale Woreda complained that even the CAHWs program is not consistent in its implementation and a lot has to be done to educate animal health owners. He further mentioned that most of the diseases reported in the clinic are diseases related to malnutrition including but not limited to parasitosis as well as diseases due to poor management of animals. Until now, the government has never exercised the utilization of the drug shops and CAHWs as a means to constantly send out animal health information to pastoralists and thereby "educating pastoralists". The AHD showed willingness to the proposed idea by the assessment team about cost sharing with PVPs and even CAHWs in the production of AHEMs on selected animal health issues identified by the department. Even the AHD officer said that, "there is no better way than this to make a sustainable way of animal health information (AHEMs) through the small fund the department is having for publication in general and AHEMs in particular". The LCRDB in Afar region is concerned about the low level of mainstreaming animal health programmes in governmental, non-governmental and private organizations in the pastoral regions, and the weak coordination and networking among the few organizations (mainly non-governmental) that are working on animal disease prevention and control.

#### Particular Efforts in Afar cluster

*In Afar region, the Animal health Beuro of both Amibara and Fentaleworeda reported to the assessment team that let alone production and dissemination of AHEMs that can be given to pastoralists, the office is by far less organized in compilation of disease incidences and reports in the area. Few years back education of pastoralists during vaccination campaigns and other animal disease awareness campaigns used to be given in Woredas like Eldir and Dubti by Afar Pastoralist Development Association (APDA) in collaboration with the agricultural office, however, the practice is discontinued for unobvious reason. Furthermore, there was a vaccination campaign using posters and flyers about the disease which claimed the life of many of the sheep and goats under pastorlaists possession in most woredas of Afar Peste des Petits Ruminants (PPR) for 3 years twice per year since 2001.*

*The AHD officer pointed out that poor infrastructure, lack of budget and less attention given to the animal health sector as well as poor linkage between the different actors involved in the animal health service delivery including private practitioners, not to mention the poor reporting and surveillance in the area, we are unable to coordinate our services to "educate pastorlaists". Even worse, the woreda is in acute shortage of budget to even give refresher trainings to its animal health assistants. Most of the information passed to the CAHWs and pastoralist is only through verbal communication, "which is only a meal for the day".*

*Source: (Animal health department Office, Agricultural Beuro of Amibara and Fentale Woreda).*

### 3.1.2. Response of NGOs and bilateral projects

In some lowland areas, a few NGOs and bilateral projects are reaching out to pastoral communities and trying to raise awareness and provide necessary support around animal health issues. Examples of some organizations and their activities around animal health service, most importantly around AHEMs is discussed hereunder (NB. Only few organizations were available for the interview during the entire assessment):

**Action for Development (AFD):** This is a local NGO that works together with the Irish-based agency GOAL in supporting CAHWs refresher trainings to address animal health issues for several years now. They have given special attention into their programme to improve animal health education through several venues including workshops and trainings to PVPS and CAHWs besides their support in the provision of water facilities and to support livelihood diversification among Borana pastoralists in Oromia Region. This organization has been supporting vaccination campaigns and has distributed several posters, banners, brochures to the animal health assistants, PVP owners, CAHWs and pastoralists. It was told to the assessment team that earlier in 2011, AFD supported the production and dissemination of AHEMs for Black leg, FMD and Anthrax, focusing mainly on the clinical signs, and treatment, prevention and control options. Although pictorial representations were used in the AHEMs yet it should consider need and context of the animal owners, who are the end users of the same to make it more practical. It was pointed out that although the use of AHEMs as a means to reach out the livestock raisers, mobile pattern of pastoralists makes it difficult to measure its effectiveness. Moreover, conflicts and serious drought are among the challenges that disconnect actors to do the follow up and sustain such activities in the pastoral settings.

**Agri-service Ethiopia:** This is a local NGO working mostly in two Woredas of Borena zone, namely, Miyo and Dire. It supports the government office during vaccination and rangeland management efforts as well as water conservation and pond rehabilitation activities. They have a huge involvement with community based institution such as CAHWs. Together with the government, they have conducted workshops and trainings in the area of animal health most particularly in the area of animal feeding and animal husbandry. They have been doing these similar activities with especial attention to their operational areas since 2010. Agri-service Ethiopia also supported CAHWs refresher training 3 to 4 times since 2010. Representative of this organization mentioned that they have used posters, brochures, banners and other flyers in all of their training activities and workshops. Even more they have used visual communication channels to teach the community on animal disease of economic importance. They said the visual communications are effective way of transmitting animal health messages especially to pastoralists. Furthermore, it was mentioned that if one can put effective way of monitoring strategies in place it would be easier to measure the effectiveness of AHEMs disseminated to pastoralists. Lack of coordination and integration of activities with the government, private practitioners and other stakeholders implementing animal health related activities remained the main challenge in strengthening and widening area of coverage of their activities in terms of educating livestock owners through AHEMs; for the very reason that production and dissemination of AHEMs requires quite a resource, both human and monetary.

**OXFAM Ethiopia:** The NGO Oxfam based at Jijiga was also visited during the assessment. Oxfam provides support to PVPs and CAHWs in collaboration with the government. They support vaccination campaigns as well as disease surveillance and reporting activities done by the government. They have organized CAHWs refresher training almost every year. Moreover, they supported government efforts in controlling illegal drug circulations through organizing workshops. Oxfam has also developed a disease



reporting format which is used by CAHWs and is collected from them by PVPs which will ultimately reach the government for further planning and action, a model which will enhance the disease reporting as well as linkage among actors. The representative has mentioned that the use of such material that can easily be understood can greatly enhance the "education effort" of pastoralists in animal health and otherwise. Oxfam indicated to use outbreak situations, CAHWs feedback, coordination meetings with the government and actual field visit and focus group discussions (FGDs) are the venues to gather information about animal health issues in order for them to determine the contents of AHEMs. In 2014, Oxfam planned to embark on educating pastoralists and livestock traders on important trans-boundary animal diseases in collaboration with the government. The animal health coordinator at Oxfam stated that vigorous use of AHEMs such as posters, booklets and other audio-visual means of communication are highly recommended if we have to reach animal herders with animal health information and address animal disease and related issues.

**GOAL Ethiopia:** The main operational area of this NGO is in Yabello Woreda of Borena Zone. Although this organization has a lot of diverse activities in these pastoral areas, its animal health activities are limited to Yabello and Telltele Woredas. With regard to animal health they have conducted several workshops and trainings and supported vaccination campaigns and CAHWs refresher trainings. Among the trainings provided, the 22 and 18 trainings were conducted in year 2013 and 2014 respectively, focusing on animal health. In their trainings they said they claimed to have produced and disseminated posters and leaflets with lots of pictures and diagrams which are more understandable to PVPs and/or CAHWs. The focal messages used were mostly on "general disease management". Although the effectiveness of these AHEMs in educating livestock owners were not measured and/or researched until now in a coordinated manner, but there is an effort to do so through visit to animal owners and also through focus group discussion during vaccination campaigns and other gathering opportunities for instance during participatory rangeland management activities. However, it was found out that lack of budget, poor coordination with the government and NGOs has limited the area of coverage and the level of involvement of pastoralists in the planning of almost all animal health related activities including production and disseminations of AHEMs.

**GAYO International:** This organization was encountered in the Southern Cluster and its activities are limited to Borena Zone of Oromia region. The involvement of this organization in the animal health intervention is limited and has conducted few trainings and workshops on two consecutive years, 2010 and 2011. During these years, they organized campaigns, workshops and trainings on the most prevalent disease namely, "*Coenurus cerebralis*" known by its local name as "*Sirgo*". These campaigns, workshops and trainings were given to government veterinary professional, abattoir personnel, PVP owners, CAHWs and community clan elders. During these events AHEMs such as posters and brochures were used to educate livestock owners about the life cycle of the parasite and ways of preventing and controlling the disease. The reduction in the prevalence of the disease as reported by the government was an encouraging finding. However, the effort lasts only for two years because the project that supported these activities ended in two years' time. It was pointed out, during the interview, that the sustainability of most activities done in these ways is always in question and it is always contingent upon the availability of budget. If planned and done with involvement of private actors and CAHWs, production and dissemination of AHEMs is a good way of educating the illiterates and it can be considered as an informal education.

**Save the Children and CARE:** Through many of their offices in the different operational areas, these organizations are doing a lot of activities in the area of human health, animal health, livelihood

diversification, asset building and participatory rangeland management, etc. Many of their activities are community engaging in nature and have to do with publicizing concerns and issues of the communities. With regard to animal health related activities, representatives mentioned to have involved in the organization of CAHWs refresher training to CAHWs and veterinary drug related trainings to PVPs. It was indicated that they disseminated AHEMs in many of the trainings and workshops in pastoralist areas of Afar, Oromia, and Ethiopian Somali regions but the effectiveness of these AHEMs in sending the message across to livestock owners is still vague and requires further research. Furthermore, to attain maximum result in educating livestock owners about animal health care through AHEMs, it is mandatory to involve and create linkage among veterinary professionals, private practitioners including PVPs and also CAHWs. It was strongly recommended that the appropriateness of AHEMs to livestock owners should be watched out. Limited budget, poor infrastructures, weak coordination among actors and lack of proper disease reporting, and poor follow-up are the major problems listed by the respondent as the challenges to sustain interventions around animal health service.

### *3.1.3. Responses of CAHWs*

A total of 11 CAHWs were interviewed in this assessment. The unavailability of CAHWs during the entire assessment period limited the number of CAHWs to this number. Of the 11 CAHWs seven, three and one were from the southern, eastern and Afar clusters, respectively. All of the CAHWs are actively engaged in the service delivery to the remote kebelles visited. All of them participated in two to four CAHWs refresher training over a period of two to four years following the establishment and startup support they got from NGOs and GOs. These CAHWs point out that they get animal health information from NGO, GO during refresher CAHWs trainings, workshops and during vaccination campaigns. Moreover, some of them indicated that they also learn about animal health issues from PVPs. When they were asked if they have received any AHEMs, all CAHWs mentioned that they received the AHEMs beside the trainees' manual for primary animal health care. They said that they were highly involved in educating the households they visited for service delivery, but the "education" aspect which was so informal happened without guided AHEMs because most of the AHEMs were not suitable to pastoralists' context. But, all of them expressed their strong desire to get them and recommended that posters with a lot of pictures on them are more understandable to them and to the pastoralists (the livestock producers) and that will make their service more attractive.

### *3.1.4. Responses of private veterinary pharmacies*

#### *Jijjiga PVP (Eastern cluster)*

*The wholesaler mentioned that he has participated in many of the CAHWs refresher training and awareness creation campaigns organized by the government for many years now and also on trainings organized by NGOs. He mentioned that he sometimes used posters and brochures received mostly from the government and sometimes from NGOs to demonstrate the effects of the disease display and explain the effects of some diseases like CCPP and Pasteurellosis. Nonetheless, he indicated that the materials are not that many to give it to CAHWs and pastoralists and neither are the AHEMs useful for self-study especially to the community with low literacy level.*

**Eastern cluster:** In this assessment six PVPs which functions as wholesalers and/or retailers were

interviewed. Of the six PVPs only a single PVP functions as a wholesaler which is found in Jijiga, while the rest five function as retailers. Five of the six PVPs interviewed indicated that they get information about animal health issues in the region from the government offices during their participation in workshops, discussion forums and also during their involvement during vaccination. None of the wholesalers at Jijiga mentioned that it received AHEMs like posters, brochures, etc. Although leaflets were distributed during those events about the workshop, they only described about the purpose of the workshops and were not of "educational" in nature. Additionally, it was also mentioned that the education materials received so far were far from animal health input supply.

The wholesaler, namely, "Jijiga PVP", however, indicated that they received posters few times the content of which was on the area of ectoparasites affecting ruminants and measures that have to be taken. The rest of PVPs said that in general they only involved in explaining the drugs and their use in the treatment of specific diseases. The PVPs frankly mentioned that they never had put an effort to educate CAHWs and pastoralists that visited their shops. Furthermore, most of the pastoralists were always in a hurry and often they don't did not take time to discuss over their livestock health. At Jijiga, "Kebribeyah PVP", owner indicated that he has a plan to use an "LCD screen message" in a local language to display pastoralists and CAHWs about the use of the most important drugs in use for treating diseases and also "means of transmission, clinical signs, and prevention and control of diseases of importance"; however, he said that "his greatest challenge will be getting the required animal health messages in a soft copy", which is a good insight observed by the assessment team.

**Afar cluster:** the assessment team was not able to reach all the 13 PVPs registered in Zone 3 of Afar because of communication problem and poor accessibility issues. Only two of the PVPs in Fentale Woreda were available for the interview. These PVPs function as retailers and are owned by Animal health professionals. It was clearly spelled out by these PVPs that except involving in workshops, awareness creation and sensitization campaigns, vaccination programmes and very little training [mostly done by the government and few by NGOs, most specifically FAO], they have never received any AHEMs that were relevant to educating neither CAHWs nor pastoralists. Though these PVP owners were at the same time government employees, they were not having access to getting AHEMs which were more appropriate to their customers. Of course, the PVPs mentioned that they give professional advice to the same but they agree to the idea that AHEMs are more appropriate to CAHWs and pastoralists because the materials can be shared among pastoralists due to the social norm of "sharing culture" in the Afar community.

***Rohobot PVP (southern cluster)***

*The weakness of the AHEMs as mentioned by the respondent from Rohobot PVP were two fold. One is that the AHEMs are prepared only for few diseases and drugs while there are plethora of devastating disease that severely affects the production and productivity of livestock in the area. Secondly the AHEMs don't consider literacy level of CAHWs and pastoralists. So it was suggested to make the AHEMs more diverse and plenty in number as well while contextualizing the AHEMs to the literacy level especially of pastoralists. The owner of Rohobot PVP has reveal that he has produced (out of his initiative) posters and banners to physically go to different villages to teach about the effective use of drugs by using these AHEMs but he said that he needed support to enable him do this consistently.*

**Southern cluster:** A total of six PVPs were included in the interview in the southern cluster, three from

Yabello and another three from Moyale Woreda of Borena Zone. Except the two wholesalers at Yabello, all the remaining PVPs function as retailers. During the interview, it was found out that only the two wholesalers said that they received AHEMs including leaflets, brochures, posters and banners mostly from NGOs and few from government offices. However, only the one PVP at Yabello namely, "Rohobot" used the AHEMs to teach/educate as well as give out to CAHWs and pastoralists. The owner also stated that this way of activity side by side to doing business increase business linkage with customers and thereby increasing sells. The other wholesaler use the AHEMs received only for personal consumption.

### 3.1.5. Responses of pastoralists

The pastoralists were asked how they get animal health related information. A variety of responses were gathered in the assessment. Overall 41 of the 115 pastoralists (35.6%) mentioned that they have received AHEMs (Table 1). The majority (68%) of pastoralists mentioned that they heard about animal health from CAHWs while 28% of the respondents indicated that they get animal health related news during their visit at the health post and/or during vaccination campaigns, whereas 4% of the interviewed pastoralists get the information from PVPs and NGOs. In eastern cluster quite large number of pastoralists (74%), most of them from Jijiga, heard about animal health issues through radio program, while 10% of the respondents heard about animal health related issues through CAHWs. The remaining 8 (12 %) of the respondents mentioned that they heard about animal health issues from government clinics and during vaccination, and PVPs, respectively. In the southern cluster, the number one means to getting animal health information by the pastoralists was through the CAHWs (54%) government clinics and health posts (27%), PVPs (13%) and NGO (6%) in a decreasing order. The present study revealed that CAHWs were the most important animal health extension agents in the three clusters. Exceptionally, in eastern cluster pastoralists mentioned that the radio program helps them get basic information about animal health and animal husbandry issues.

Table 1. Pastoralists who received AHEMs in each clusters

Received AHEMS	Afar Cluster	Eastern Cluster	Southern Cluster	Total
	No (%)	No (%)	No (%)	No (%)
Yes	10 (28.6)	14 (35%)	17 (42.5)	41 (35.6)
No	25 (71.6)	26 (65%)	23 (57.5)	74 (34.4)
Overall	35 (100)	40 (100)	40 (100)	115 (100)

The pastoralists included in this study were asked if they got AHEMs besides the non-materialized information like what they got through radio programs and discussions and dialogues happening in many of the awareness creation and sensitization activities including the vaccination campaigns. They responded that it was uncommon to get AHEMs except in few cases. As indicated in Table 1, 71.6% (25/35) pastoralists in Afar mentioned that they never have received any AHEMs, while 28.4% received AHEMs either from government during vaccination or from NGOs. In the eastern cluster 65% never received AHEMs while the remaining 35% received AHEMs mostly from government clinics and health posts. The highest number of recipient was from southern cluster where 42.5% (17/40) pastoralists claimed to have received AHEMS from CAHWs and government clinics and during vaccination.

The present assessment revealed that pastoralists in eastern and southern cluster, 41.6% (10/24) received AHEMs more than those in Afar cluster, 16.7% (4/24) (Table 2). The disparity might be among others,

lack of linkage between the different actors, infrastructure issues or less emphasis by the different animal health service providers. Lack of coordination of actors, which was mentioned as one of the challenge in reaching the pastoralists in Afar might also contributed to this outcome in Afar cluster. On top of that, as can be seen in Table 2, the involvement of CAHWs (41.6%) in reaching pastoralists was an interesting thing to give attention to because that can best serve the community at their homestead without them necessarily coming to the service providers in person. Of course, the greatest gap here is that the private sector had a lower participation (16.7%) in reaching pastoralists with AHEMs either produced by or received from the government or NGOs

Table 2. Organizations/Community members involving in the production and/or dissemination of AHEMs in the three Clusters

Organizations/ communities	Afar Cluster	Eastern Cluster	Southern Cluster	Total
	No (%)	No (%)	No (%)	
NGO	1 (25)	0	0	1 (4.2)
Government	3 (75)	5 (50)	1 (10)	9 (37.5)
PVPs	0	2 (20)	2 (20)	4 (16.7)
CAHWs	0	3 (30)	7 (70)	10 (41.6)
Overall	4 (100)	10 (100)	10 (100)	24 (100)

With regard to the formats of the AHEMs received, 75% (18/24) of pastoralists indicated that the leading type of format was posters and the least was banner (4.2%) (Table 3). It was also indicated that all of the formats were prepared in the local languages and had picture in them. Furthermore, the interviewed pastoralists who received the AHEMs (100%) told the assessment team that posters were the only materials that were prepared in a more understandable way. Hence, working on the preparation of AHEMs in poster form will most probably help the pastoralists comprehend complex matters in the easiest way.

Table 3. Formats of Animal Health Education Materials produced in the three Clusters

AHEMS format	Afar Cluster	Eastern Cluster	Southern Cluster	Total (%)
	No (%)	No (%)	No (%)	
Brochures	1 (25)	3 (30)	1 (10)	5 (20.8)
Poster	3 (75)	6 (60)	9 (90)	18 (75)
Banners	0	1 (10)	0	1 (4.2)
Others (audio, video, charts, etc)	0	0	0	0
Overall	4 (100)	10 (100)	10 (100)	24 (100)

The number of copies of the AHEMs pastoralists were able to get was not enough and they did not get them regularly because the dissemination happened whenever they go to veterinary clinics or during vaccination campaign and/or while visiting PVPs in nearby towns and sometimes from CAHWs in the villages. Increasing the linkages between PVPs and CAHWs and pastoralists through several mechanisms might help in the dissemination of AHEMs down to the household level.

In the present assessment it was learned that to most part (66.6%) the AHEMs received by pastoralist were around livestock diseases. While an equal percentage (16.7) of pastoralists received AHEMs that focused on general husbandry and animal feeding (Table 4). Messages around veterinary drugs were not

mentioned to be received by any of the pastoralists interviewed, again indicating the less attention given to veterinary inputs or the less participation of PVPs in suggesting the contents of AHEMs although they were among the recipients during workshops or trainings. Or it might be because of their minimal role in disseminations of AHEMs on top of supplying inputs in the supply chain. The PVPs strongly suggested that they should be called upon during the designing and preparing the AHEMs as well as in deciding the focal messages. They complained that mostly they were only called out to hear the messages and sometimes to receive AHEMs which were already prepared without their participation in the planning and designing. The frequency by which AHEMs received by the respondents were variable and it ranged from once per year in the southern cluster to twice per year in eastern cluster. In Afar cluster, three pastoralists received only once in year 2010 and a pastoralist said he received twice in year 2012 only. These indicated the unevenness and the inconsistency of the production and/or the disseminations of AHEMs by government offices, or PVPs or CAHWs.

Table 4. Focal messages of Animal health Education Materials produced in the three Clusters

Focal Message	Afar Cluster	Eastern Cluster	Southern Cluster	Total (%)
	No (%)	No (%)	No (%)	
Livestock disease	3 (75)	5 (50)	8 (80)	16 (66.6)
General husbandry	0	2 (20)	2 (20)	4 (16.7)
Nutrition and Animal feeding	1 (25)	3 (30)	0	4 (16.7)
Overall	4 (100)	10 (100)	10 (100)	24 (100)

Among the diseases the pastoralists listed for which they received AHEMs include CCPP and Rabies in the southern cluster; CCPP, sheep and goat pox, pasturellosis in eastern cluster and sheep and goat pox and CCPP in Afar cluster. The pastoralists tried to explain that clinical signs and lesion of infected animals were included in the AHEMs they received especially in the big posters; whilst those AHEMs prepared in the brochure formats the text messages (captions and labeling) were very small and pictures were unclear which makes it difficult to comprehend the messages in the absence of someone who can explain it to them.

The respondents mentioned that the AHEMs helped them how to prevent the exposure of their animals to deadly animal diseases and how to control after it occurred. They explained how the techniques included in the AHEMs on the preservation of animal feed and appropriate feeding practices were very much helpful to maintain the body condition of their animals. Furthermore, the AHEMs that was focused on the relationship between animal feeding and disease occurrence was pointed as among the lessons they have got from the AHEMs.

The overwhelming response from the Interviewed pastoralists was that the use of posters was preferred to other form of AHEMs because of their inability to read and write when it comes to paper based materials. Because AHEMs can be used as reference materials at all times, they said it should be prepared in a durable format (laminated) as well. In addition to that some of the respondent, although they never had a chance to listen to or watch audible or visual materials on animal health, they said that would be a better way to learn about animal health care.

### 3.2. Challenges around Production, Dissemination and Application of AHEMS

The current practice of production and disseminations of AHEMs as a whole has been said to have a

number of challenges as per the respondents interviewed at various level of the animal health service and/or input supply chains. For the sake of simplicity, the challenges are mentioned at the level of the government, NGOs, PVPs, CAHWs and pastoralists hereunder.

#### Government offices (AHD):

- ◆ Lack of planning: Most of the animal health department offices do have training and workshop plans but don't have a plan in the production and dissemination of AHEMs. Most of the "unplanned" dissemination occurred only through the support of NGOs.
- ◆ Poor infrastructure makes it difficult for the service providers and input suppliers to distribute AHEMs at household level.
- ◆ Lack of enough budgets set aside for the purpose of production and disseminations of AHEMs. The available small fund is used only to produce limited number of copies which are channeled to the end users through government veterinary clinics, and/or PVPs and CAHWs.
- ◆ Lack of a center/structure in the regional government offices that specifically regulates the production and disseminations of AHEMs.
- ◆ Less focus given to animal health sector in the past that has an implication to resources that can be used/mobilized.
- ◆ CAHWs drop-outs is among the most important problem faced as they are important agents in giving out and receiving information between the government office and pastoralists.
- ◆ Weak disease reporting and surveillance system also contributes to the production of animal disease messages which are less-rated.

#### NGOs:

- ◆ Less focus was given to production and dissemination of AHEMs in educating pastoralists and rather spending much of their efforts in training and workshops which were not accompanied by handouts of such materials.
- ◆ Less availability of funds assigned for AHEMs.
- ◆ Lack of coordination among the various projects run by the several NGOs operating in pastoral parts of Ethiopia.
- ◆ Mobility of pastoralists and other episodes such as drought, flood and bouts of conflicts in pastoral areas affect the dissemination of AHEMs and it also makes monitoring and measurement of impact as a result of AHEMs difficult if not impossible.
- ◆ Lack of proper feedback in the circle of animal health service provision makes it difficult to monitor and measure the effectiveness.
- ◆ The poor infrastructure of pastoral and agro-pastoral areas limited the linkage among actors hence less coverage of the AHEMs produced.
- ◆ The poor literacy of the livestock owners also weakens the effort in the production of AHEMs.
- ◆ Lack of center responsible to regulate the quality, type and frequency of AHEMs produced by the different NGOs.
- ◆ The life of production and dissemination of the AHEMs is only as long as the projects last.
- ◆ Unsustainable mechanism of production and dissemination because of lack of coordination, integration and linkage among the various actors involved in this activity
- ◆ Lack of comprehensive data on the demography, disease prevalence and literacy made the

dissemination of AHEMs in blanket

**CAHWs:**

- ◆ Lack of incentive for the extra provision of AHEMs and do the education besides the provision of service.
- ◆ Inability to read and understand the messages especially those AHEMs in brochure formats makes it pass the messages to pastoralists.
- ◆ The diversity of animal health problem didn't tally with the type of materials produced and given to them.
- ◆ The poor quality of some of the AHEMs produced by the animal health department and other NGO projects makes it difficult to see the pictures very well.
- ◆ The uneven distribution of CAHWs service also limited the number of AHEMs reaching the pastoralist in some kebelles.

**Pastoralists:**

- ◆ Inability to read and understand the messages especially those messages produced in pamphlets and booklets.
- ◆ The PVPs and CAHWs don't explain the content of the AHEMs unlike those veterinary professionals at the government veterinary clinics.
- ◆ Lack of inclusiveness in most workshops and trainings which serve as a platform to discuss with pastoralists the need for and uses of AHEMs.
- ◆ The long distance they have to travel to the PVPs and government offices makes it difficult to get access to the AHEMs.
- ◆ Few CAHWs available in each kebelles also reduced access to AHEMs.
- ◆ Failure of participation in the designing of the type and content of AHEMs produced by the government and/or NGOs.

**3.3. Exploration Areas for Wider Impact of AHEMs**

Much greater efforts need to be made to obtain good data on the situation with respect to production and disseminations of AHEMs in pastoral areas in Ethiopia. Research should not be simply extractive; it should be done in ways that involve pastoral communities in discussing and analyzing the situation and responses, and should involve other stakeholders (government animal health professionals, NGOs, PVPS, CAHWs, pastoral groups etc) in discussing the research findings and implications for their work. Particular attention should be given to investigating the roles of PVPs and CAHWs as agents in the production and dissemination of AHEMs in the pastoral areas, in order to gain a better understanding of the roles they play and for whom, the constraints they face, the positive impact they have in using AHEMs in their routine activities and business dealings.

Exploration areas to have a wider impact of AHEMs in pastoral areas can include:

- ◆ Initiation of the animal health departments in the government structure to take a lead in planning, coordinating programs and projects to pool resources for a sustainable production and dissemination of AHEMs;
- ◆ Engaging agencies working in the area of animal health operating in pastoral parts of Ethiopia



to support the government and other animal health service providers and input suppliers in alignment with their development agenda;

- ◆ Supporting private practitioners such as PVPs in collaboration with the government in the dissemination of AHEMs;
- ◆ Utilization of organizations such as Ethiopian Pastoral Research and Development Agency (EPARDA) as a center for strategizing the use and application of AHEMs circulating in the pastoral setting to educate the livestock owners may enhance the production of standard AHEMs which are need and evidence based;
- ◆ Improving transport infrastructure such as roads and buses in a long run can also serve as a means to send the AHEMs to a wider place besides giving an opportunity to bring together the different actors;
- ◆ Organizing ways of bringing the private service providers (e.g. PVPs) closer to the household level, so as to increase linkage and hence make dissemination of AHEMs more meaningful curbing the infrastructure issues that put the various actors far apart ;
- ◆ Improving the communication infrastructure and dissemination of information, including the use of local-language radio (as is the case in Jigjiga), films and drama groups adapted to the culture and modes of communication among the different pastoral communities to supplement the AHEMs could enhance the usability and applicability of the same;
- ◆ Feeding information about the need for the use of AHEMs into traditional channels of communication (such as through traditional leaders and at water points and marketplaces) can enhance the search for paper based/materialized AHEMs by community based institutes (like CAHWs) and livestock owners;
- ◆ Facilitating discussions between the various stakeholders (government, NGOs, PVPs, CAHWs, pastoral groups, and livestock owners) on animal disease to identify, explore and recommend the contents of AHEMs and the modality of production and dissemination;
- ◆ Supporting studies/research that were conducted on the sustainability of AHEMs and their use in educating livestock owners;
- ◆ Organizing a consultative workshop with government, NGOs, PVPs, CAHWs, pastoral groups and livestock owners as to "payment modalities" for the AHEMs to be produced and disseminated along the input supply and service delivery routes; and
- ◆ Collaborating with the government and several other NGOs as well as private practitioners can help in bringing ideas and resource together to design strategies for specific AHEMs to have maximum impact in educating livestock owners.

#### 4. CONCLUSIONS AND RECOMMENDATIONS

The pastoral part of Ethiopia is inefficient with respect to the huge demand placed on the sector. These calls upon integrated and coordinated efforts of actors involving in animal health service (both from public and private goods side) to work in a rhythm and in a harmonized manner for a common goal of reducing animal disease. Although efforts of production and disseminations of AHEMs are going on by the animal health departments, NGOs and very few PVPs in the three regions (Afar, Oromia and Somali) visited, it is being done with less coordination, with no measure of effectiveness and in unsustainable modality without even considering the prevalence of disease and related issues and with less participation of the various stakeholders, most importantly the livestock owners. The relatively good participation of

CAHWs (8%) in disseminating AHEMs, the proliferating PVPs as equally as the government is an opportunity to reach out livestock owners with animal health message and there is a good hope that if it is done over a long time in a sustainable way it may result into an instrument of educating the “poor and illiterate” pastoral community.

Therefore, in light of the gap observed the following approaches are recommended:

- ◆ Organize a workshop to share the findings of the HUU-research to several of the stakeholders to get mode feedback and put the recommendations into actions;
- ◆ Conduct a rapid assessment on animal health and related situation in pastoral areas to address them through AHEMs and make sure that the findings are discussed with experts in the government and other agencies operating in pastoral areas;
- ◆ Produce adequate AHEMs preferably using posters/banner and other pictorial and figurative representation of disease (that will help livestock owners in comprehending complex matters in simple way), for the selected disease and use the venues of education and vaccination campaigns for dissemination of the same;
- ◆ Organize consultative meeting or discussion forum with other stakeholders to identify and design innovative approaches to addressing animal health issues in the pastoral setting that complement the use and application of AHEMs;
- ◆ Effectively utilize PVPs and CAHWs in disseminating information and AHEMs down to the pastoralists through linkages, workshops, campaigns; as well as proper monitoring and evaluation for measuring effectiveness;
- ◆ Design a more sustainable alternative for production and dissemination of AHEMs and organize a consultative meeting with the animal health offices and others who has a stake for the sector; and
- ◆ Organize a discussion forum and coordinate activities with government, local and international NGOs, private practitioners to establish a “unit” that pool up resources, coordinate production, monitor quality and better utilize the same to create a sustainable modality of production and disseminations of AHEMs.
- ◆ Strengthen activities around linkage between animal health service providers, input suppliers, CAHWs and livestock owners to enhance the demand and consumption of AHEMs;
- ◆ PRIME and other stakeholders should make production and dissemination of AHEMs an integral part of workshops, trainings, forums, meetings, campaigns, etc. relevant to the events;
- ◆ Involve experts including but not limited to animal production, veterinary professionals, graphic designers, anthropologists, to enhance the quality and appropriateness of AHEMs for a specific context;
- ◆ Seek to understand local responses with regard to livestock production and livestock diseases as a starting point for discussions on what is working and what is not for pastoral households, communities and production systems, leading into discussions among pastoralists and local agencies about how to respond more effectively.

## 5. REFERENCES

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## 6. ACKNOWLEDGMENT

The authors would like to acknowledge the livestock owners for their willful participation in providing information for the assessment. The genuine provision of materials and information by the various GOs, NGOs, PVPs visited during the assessment is highly appreciated.

## MARKETING SYSTEMS OF VETERINARY DRUGS IN SELECTED PASTORAL AND AGRO-PASTORAL PARTS OF ETHIOPIA: CHALLENGES AND OPPORTUNITIES

Workineh Kassa<sup>1</sup>, Desalegn Amlaku<sup>1</sup> and Fasika Kenea<sup>2</sup>

### Executive summary

*Livestock plays multiple roles in the livelihoods of pastoralists. However, a number of constraints impede the livestock sector's national economic contribution and benefits accruing to the pastoralists. Among the limiting factors to the enhanced productivity of the livestock sector to pastoralists is limited veterinary drugs supply. In this respect, improving the existing marketing system for veterinary drugs could improve livestock productivity of pastoralists. With this understanding, Haramaya University conducted a study on the marketing system for veterinary drugs in the Southern-Oromia, Somalia and Afar clusters of PRIME project. The overall objective of the study was to analyze the marketing systems of veterinary drugs. To this effect, the study analyzed the possible challenges and opportunities to improve the marketing system for veterinary drugs in the three PRIME clusters.*

*The marketing system for the veterinary drugs is maintained by the actors ranging from the manufacturers/importers to the retailers at the lower level of the hierarchy. In pastoralist areas, only wholesalers and retailers operate and there are no agents or branches of the big wholesalers and importers.*

*Significant proportion of sampled pastoralists in the three PRIME clusters indicated that quality of the veterinary drugs makes the formal veterinary shops their first level ranked preference. This means that pastoralists strongly believe in general that quality drugs are offered by the formal drug shops as compared to that of the informal ones. But problems related to the availability of drugs and long distance issues were mentioned as the least benefits of buying drugs in the formal drug shops. This may mean that problems of access and availability to the formal drug shops might be among the factors that force pastoralists to consider informal drug sellers as alternatives.*

*The trust level of the pastoralists also varies across the market channel actors for the veterinary drugs. To this respect, out of the 120 pastoralists who provided their response, 66 percent of them indicated that they trust governmental animal health centers to buy veterinary drugs. But the trust level of the pastoralists to buy veterinary drugs from the informal drug sellers is almost equal to that of community based animal health workers (CAHWs). In terms of the source of the drugs that pastoralists believe to have caused the death of their livestock, significant proportion has indicated that the drugs were purchased from private drug shops. There are huge opportunities to the*

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*marketing system for the veterinary drugs because the use of the drugs by pastoralists is relatively increasing from time to time. In addition, there are also opportunities to private veterinary pharmacies such as adding the clinical services in their service packages. But still there are challenges to the marketing system of the veterinary drugs as a whole.*

## **1. INTRODUCTION**

The provision of adequate animal health care is of fundamental importance to pastoralists' present and future food security. On much of the Ethiopian pastoralists' areas, livestock productivity is low and national needs for livestock export market are not being met (Yacob and Catley, 2010b). To this respect, the (agro) pastoralist of Borana, Afar and Somali are considered to be the traditional sources of livestock which supply a significant proportion of livestock for export market (Yacob and Catley, 2010b). However, a number of constraints impede the livestock sector's national economic contribution and benefits accruing to the pastoralists. Among the limiting factors to the enhanced productivity of the livestock sector is limited veterinary drugs supply. In this respect, timely access to veterinary drugs and related services to animal health is a critical requirement to save the livestock of pastoralists and enhance the livestock productivity. Furthermore, improving the existing marketing system for veterinary drugs could improve livestock productivity of pastoralists. However, the recurring outbreaks of animal diseases coupled with weak and unreliable marketing system for veterinary drugs have devastated the livestock population over the recent past and undermined the resilience and livelihoods of pastoralists (Yacob and Catley, 2010a). The fact that pastoralists are generally located at remote and peripheral areas might have also negatively impacted the timeliness and availability of the veterinary drugs through the formal marketing system.

### **1.1. Marketing System for the Veterinary Drugs**

The import of veterinary drugs is a key sub-sector for Ethiopia, one of Africa's largest producers and exporters of livestock and livestock products (Greenhalgh and Orchard, 2005). The import of veterinary pharmaceuticals to Ethiopia was a monopoly of government until the mid-1990s. Veterinary drugs are largely imported in response to tenders issued by the Federal government in response to requests of regional government and also sold into complex private marketing networks. Drug importers also import to maintain their stock levels and sell largely to a group of wholesalers and retailers in Mercato, Addis Ababa's main market area. The wholesalers and retailers in turn sell drugs to private veterinary pharmacies and other outlets, sometimes through an intermediary tier of traders. Some also act as retailers, selling drugs to larger livestock-producers. Some seem to have established longer-term relationships with clinics and retailers in the regions, including remote pastoralist areas.

### **1.2. Policy Issues on the Marketing of Veterinary Drugs**

According to the interview conducted with Veterinary Drug and Animal Feed Administration and Control Authority experts, Ethiopia does not have policy specifically governing the production, distribution and use of illegal veterinary drugs. The matter is, however, included indirectly under other general policies,

programs and strategies such as ADLI (Agricultural Development Led Industrialization) (MoFED, 2007). On the basis of these general policies and plans, a new proclamation has been enacted recently by the House of People's Representatives to control the sale and distribution of illegal veterinary drugs (Proclamation No 728/2011, 2012). The proclamation, which is initiated by the Ministry of Agriculture, is the first specific law to govern illegal veterinary drug production, distribution and use in the history of the country. The mandate to control the implementation of the proclamation is given for the Veterinary Drug and Animal Feed Administration and Control Authority which is set up by the Council of Ministers regulation (Negarit Gazette, 2012a), and it is responsible for Ministry of Agriculture. The proclamation is applicable at the federal level with respect to regulatory activities of, and in setting standards in relation to, veterinary drugs, feed and veterinary drug professionals. It is also applicable in regulating trans-regional veterinary drug and feed production, distribution, promotion, storage and quality control and veterinary drugs and feed import and export activities. In this respect, the authority has been preparing different guidelines or directives to strengthen the implementation of the proclamation since its establishment in 2012. As a newly established organ the authority is not well organized, the necessary manpower is not yet fulfilled and hence it is not yet well structured. Regional governments are authorized to have their own legislation to control illegal veterinary drugs in their respective regions under the proclamation (Negarit Gazette, 2012b). However, the Oromia, Somali and Afar regional states have not yet enacted their own legislation to control illegal veterinary drugs.

The problem of illegal drugs marketing is a serious issue in the pastoralist areas, and several ways of controlling the problem such as strengthening security at border, working on awareness creation for the community and licensing private veterinary drug shop owners is still to be structured.

With this understanding, a study on the marketing system for veterinary drugs in the three PRIME clusters was carried out. The overall objective of the study was to analyzing the marketing systems of veterinary drugs in the three PRIME clusters.

## **2. METHODOLOGY**

This research was conducted on the marketing system for veterinary drugs in the three PRIME clusters. The field work for the data collection was carried out from July to August, 2014. The study used both the qualitative interviews and structured survey instrument to collect pertinent data. To examine the marketing system of veterinary drugs, individual interviews were conducted with pastoralists, private veterinary pharmacies (wholesalers and retailers) in the three clusters, manufacturer, importers and wholesalers in Addis Ababa, regional and local agricultural bureaus for the three clusters, and NGOs with interventions in veterinary drugs to pastoralists. For the qualitative case study individual interviews with 12 pastoralists, eight whole salers, 11 retailers, two importers, one manufacturer, four NGOs, and four agricultural bureau heads were conducted. In addition, data were collected from 121 pastoralists using survey questionnaire.

### 3. RESULTS AND DISCUSSION

#### 3.1. Main Actors in the Formal Marketing Systems for the Veterinary Drugs

Pastoralists and Community Animal Health Worker (CAHWs), resellers (wholesalers and retailers), importers, manufacturers, government, and NGOs are the main actors in the marketing system for veterinary drugs (see figure 1). Brief description of each actor is presented here under.

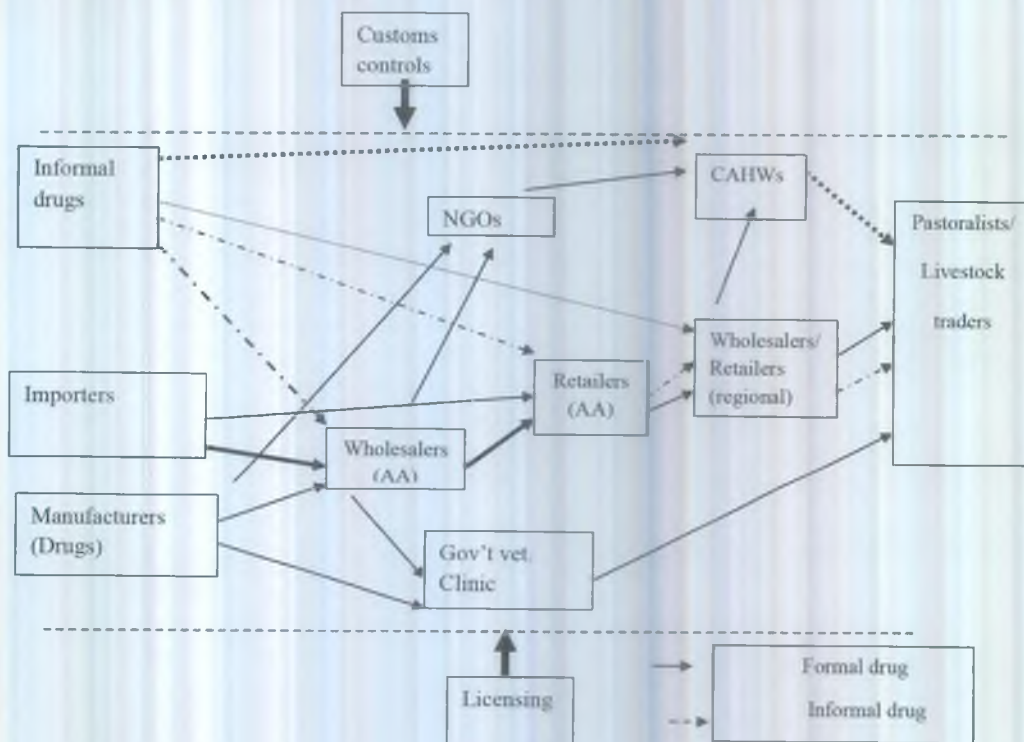


Figure 1. Main channel actors in the marketing system for veterinary drugs

#### a) Wholesaler and retailer [private veterinary pharmacies (PVPs)] in the three clusters

Wholesaler and retailer PVPs play a greater role in the distribution of the veterinary drug supply for pastoralists. The team interviewed four wholesalers and seven retailers in the three clusters to assess the

constraints and the potentials in the marketing system for veterinary drugs. Most of the wholesalers and retailers in pastoralist areas stated that they buy the veterinary drugs from Addis Ababa largely from retailers, wholesalers and manufactures. They buy drugs from different suppliers based on the price and availability of drugs that are demanded by pastoralists. They don't have contractual based suppliers but they make their orders based on their stock levels. The wholesalers and retailers in pastoralist areas make orders for drugs individually and because of this they don't receive quantity discounts from wholesalers and retailers in Addis Ababa. The mode of transportation is through Isuzu trucks included with other items. Some wholesalers in pastoralist areas have up to eight sales branches which are located around the livestock market centers. Many of the wholesalers and retailers sell Indian and Chinese made products arguing that customer preference is largely for cheaply priced drugs.

With regard to the veterinary drugs control and regulation, many wholesalers and retailers stated that there were some regulatory visits by their regional agricultural offices. But they stated that the control and regulatory systems are not regular and strict to deter some unethical issues in the veterinary drugs marketing (e.g. illicit drugs circulation). Many of the retailers admitted that drug shop owners usually hire unprofessional (usually relatives) shopkeepers as drug sellers. Some drug shops in pastoralist areas blamed others for keeping illegal drugs mixing with legal ones but they always keep their innocence in this regard. The shops which also carry informally channeled drugs are considered as beneficiaries since they buy the illegal drugs with cheap price and the regulation is not up to the level needed to deter such practices. Meanwhile, many believed that there are some improvements as compared to the times where illegal drugs are used to be sold at open market even in major markets such as Yabello.

The wholesalers and retailers in pastoralist areas pointed out the following as major challenges in running their veterinary drug businesses. These were:

- ◆ poor regulation and control on the illegal veterinary drugs;
- ◆ lack of customers awareness about quality drugs;
- ◆ pastoralists usually don't want to consult professionals in buying and using drugs;
- ◆ lack of reliable local veterinary drug supplier;
- ◆ very cheap drug supplies to CAHWs by the government affecting the market;
- ◆ financial constraints in expanding the veterinary drug business; and
- ◆ veterinary drug shops are not well equipped with professionals; some veterinary drug shop owners employ non-professionals (usually their relatives).

#### ***b) Wholesalers and retailers in Addis Ababa (Mercato)***

The wholesalers and retailers in Addis Ababa are the main channel members in the marketing system for veterinary drugs. Different veterinary drug types are supplied to the wider regional markets including that of pastoralist areas largely through them. To this respect, all the major products in the retail market and clinical service providers are supplied by the wholesalers and retailers. The wholesalers and retailers buy products from importers like Biotech and Tropical pharmaceutical which all are primarily importers. The wholesalers and retailers in Addis Ababa are involved in supplying products to regional wholesalers, retailers, private practitioners, livestock producers all over the country. However, the distinction of the marketing roles of the wholesalers and retailers for the veterinary drugs is largely mixed up in Addis Ababa (e.g. Mercato). This is because most of the wholesalers also sell the veterinary drugs as retailers.



The major products carried by wholesalers and retailers in Addis Ababa are Antibiotics (Oxytetracyclin), Anthelmintics (Albendazole, Tetramisole, Triclabendazole), Acaricide (Diazinone), Antiprotozoal Drugs (Diaminazine Aceturate, Diaminazine Diacetate), Ivermectin, Multivitamin, Knapsack sprayer, Syringes, Needles, Gloves, disinfectants (alcohol, formaldehyde). Antibiotics, Anthelmintics and Ivermectin are products that have high demand. The wholesalers and retailers stated that the demand for the veterinary drugs in the market is largely seasonal. The demand becomes high during the start of rainy season because of high prevalence/incidence of livestock diseases, and low during dry season.

Wholesalers and retailers in Mercato primarily sell Chinese and Indian drugs but some also keep imported drugs from Uruguay, Turkey and European countries. Some wholesalers and retailers already established long-term relationship with clinics and retailers in the pastoralist areas but they did not have agency agreement with any of the retailers in the region. However, many of them expressed preference to set up agency agreement with retailers in the pastoralist areas. The wholesalers and retailers in Mercato stated that importers are also acting as retailers, selling drugs to commercial livestock-producers around Addis Ababa. Many of the wholesalers and retailers stated that the veterinary drugs marketing systems is not well regulated; illegal drugs are smuggled into the country; and some importers are illegally working as retailers making the chain too long. Many of them made accusations against other unnamed wholesalers and retailers about their professional ethics in dealing with genuine and quality drugs. For example, prices are largely dictated by the wholesalers and retailers who can buy from importers in advance than others. This is because there is a tendency to hoard the veterinary drugs for speculation once they are received from the importer.

Some of the challenges forwarded by the wholesalers and retailers in Mercato include:

- ◆ poor regulation on illegally imported drugs;
- ◆ importers of Chinese and Indian cheap priced drugs actually have higher profit margin;
- ◆ the market chain for the veterinary drugs is too long that compromised the benefits of end-users;
- ◆ poor follow up after licensing of drug importation and lack of post-import random testing of drug quality which allowed the existence of legally imported low-quality drugs;
- ◆ lack of credit service to expand the business; and
- ◆ unfair participation and competition of importers in wholesale and retail businesses.

### **c) Importers of veterinary drugs in Addis Ababa**

The major veterinary drugs are imported to the country by the three major importers: Biotech PLC, Tropical Pharma Ltd Company, and Neway PLC. The market for importers is largely determined by access to foreign exchange and ensuring adherence to the governments' regulatory requirements. The importers directly sell the veterinary inputs to wholesalers in Addis Ababa or in regions that also include the three PRIME intervention areas.

According to the interview with the Veterinary Drug and Animal Feed Administration and Control Authority, the number of licensed importers in Ethiopia is not exactly known. In addition to the licensed importers, there are cases where wholesalers and retailers in Mercato also import drugs unofficially. Two veterinary importers (DAT International and Neway PLC) were selected and interviewed based on their readiness and availability. None of the importers have branch offices in pastoralist areas and such thing is not still in their future plan.

However, both of the companies confirmed that retailers which work in pastoralist areas often buy drugs from their store and pastoralists are their major end markets. But there are also opportunities emerging as some importers (e.g. Ashish) are in ongoing process to establish a drug warehouse in Jigjiga town to make the drug supply accessible to wholesalers and retailers.

This can help wholesalers and retailers from travelling to Addis Ababa whenever they want to order the veterinary drugs. The companies often imported Chinese and Indian made drugs because it is highly demand by the end users as a result of the low price. They stated that whenever they import European manufactured drugs, they encounter very low inventory turnover. They indicated that the veterinary drugs marketing system is highly price sensitive and hence it favors cheaply priced drugs. As result, they stated that business minded importers are closely working with low priced foreign manufacturers such as Indian manufacturers.

Major challenges of importers of veterinary drugs are:

- ◆ difficulty in getting licenses for new drugs;
- ◆ poor government control over illegal and low-quality drugs; and
- ◆ limited market linkages and poor customers awareness levels.

#### **d) Manufacturers of veterinary drugs**

One drug manufacturer, East African Pharmaceuticals PLC, was contacted for the interview. Despite the company's operation for more than a decade, the researchers came to learn that the company has now increasingly focused on the production of the drugs for human rather than for livestock. The reason behind the shift in focus by the company is not yet clear. The few veterinary drugs the company produces are largely supplied to universities, large animal farms and wholesalers.

#### **e) NGOs with veterinary drugs intervention**

Interviews were conducted with NGOs working in pastoralist areas to understand their previous intervention and future directions in improving the existing veterinary drug marketing system. To this end, CARE Ethiopia, Goal Ethiopia, Action for Development, and SOS Sahel were purposefully selected. All of the NGOs were involved in improving animal health services mainly through CAHWs training, training of PVPs, creating market linkage for CAHWs, and emergency drug distribution and vaccination.

Except Goal Ethiopia, however, during the time of this study projects of other NGOs related to animal health services had already phased out. All of the interviewed NGOs have indicated that much has been done to improve the existing veterinary drug marketing system. Nevertheless little has been attained to bring a sustainable improvement in the marketing system. Although the NGOs know the presence of poor quality illegal drugs in the market through cross border trades, none of them done any intervention directly targeting this issue.

The NGOs identified the following as major gaps in the marketing system of the veterinary drugs.

- ◆ lack of reliable veterinary drug wholesaler and supplier in or near pastoralists area.
- ◆ poor control over illegal cheap drugs by different governmental branches on top of poor awareness of pastoralists about consequences of cheap illegal drugs.
- ◆ lack of proper inspection of formal veterinary drugs shops.

- ◆ low market based interventions in supporting CAHWs that had created opportunistic behavior among CAHWs.
- ◆ disorganized and intermittent support to CAHWs and PVPs by different NGOs (when some NGOs support the establishment of PVPs other NGOs give free drugs to CAHWs (and pastoralists) that stifle markets for PVPs).
- ◆ unsustainable market linkage to CAHWs and PVPs that makes the market vulnerable to illegal veterinary drug market.

### 3.2. Factors Facilitating the Existence of the Informal Veterinary Drugs Marketing System

Sampled pastoralist respondents were asked to mention the benefits (or advantages) of buying veterinary drugs from formal drug shops than the informal ones in their respective area. To this respect, significant proportion of sampled pastoralists indicated quality of drugs at first level with response rate of 61.54%, 61.11% and 64.1% in Afar, Eastern and Southern cluster, respectively (see Table 1). Similarly, price of drugs was also ranked at the second level across all clusters. Among the Afar pastoralists, provision of additional services such as injections and drug information were ranked at the third benefit of buying drugs in the formal shops. Whilst availability of drugs and payment methods such as credit provision were mentioned as the least benefits of buying drugs in the formal drug shops. Eastern and Southern cluster respondents have ranked the availability of drugs in the shop at third level. In Eastern cluster, pastoralists had also mentioned the distance and additional services as the least benefits of formal drug shops. Similarly, southern cluster pastoralists mentioned the payment methods and distance as the least advantages of buying drugs from the formal drug shops (see Table 1).

The figures in table 1 indicated that although the formal drug shops are preferred on quality of drugs, the problems related to the availability and accessibility of the shops were the main limitations to pastoralists. This may mean that problems of access and availability to the formal drug shops might force pastoralists to consider informal drug sellers as alternatives. Unlike the other two clusters, formal drug shops in Afar provide better additional services by providing injection services and information about drugs application and prescription of drugs. Provision of credit sells is almost equally uncommon in all clusters but slightly better in Eastern cluster.

Table 1. Pastoralists' response on the advantages of buying veterinary drugs from formal drug shops

Features		Cluster of the area			Total (%)
		Afar	Eastern	Southern	
		Number (%)	Number (%)	Number (%)	
Advantages of formal drug shops	Quality	24(62)	22 (61)	25 (64)	72 (63)
	Price	8(21)	7 (19)	8 (21)	23 (20)
	Additional Service	3(8)	1 (3)	2 (5)	6 (5)
	Distance	2(5)	1 (3)	0 (0)	3 (3)
	Availability	1(2)	3 (8)	3 (8)	7 (6)
	Payment Method	1 (2)	2 (6)	1 (2)	4 (3)
Total		39 (100)	36 (100)	39 (100)	114 (100)

Source: Own Survey, 2014.

Sampled pastoralists were also asked to mention three main limitations or disadvantages of buying veterinary drugs from formal drug shops. Accordingly, majority of Afar cluster respondents indicated availability (34.28 %), cost or price (31.45%) and distance (17.14%) as their main limitations or disadvantages to access the formal veterinary drug shops (Table 2). This is also in line with our findings during personal interviews conducted with agriculture bureau officers in Afar weredas which confirmed that there are a few number of drug shops in the weredas. On top of the limited availability of drug shops, the existing shops do not open all the time. They only are opened and sell drugs one or two days in a week. Both Eastern and Southern cluster pastoralists mentioned cost (or higher price) and quality of the drugs as the first and second ranked limitations of the formal drug shops in their area, respectively (See Table 2). This may imply that even if pastoralists preferred the formal drug shops with their quality drug as compared to informal drug markets, pastoralists still encounter less quality drugs from the formal drug shops. This might be due to the fact that some drug shops have kept illegal drugs mixing with legally imported drugs. This fact had also been confirmed during our interview conducted with drug shop sellers in both Eastern and Southern clusters where many of the interviewees blame others for selling both legal and illegal drugs in their shop.

Table 2. Pastoralists' response on the disadvantages of buying veterinary drugs from formal drug shops

		Cluster of the area			
		Afar	Total (%)Eastern	Southern	
Features		Number (%)	Number (%)	Number (%)	
Disadvantages of formal drug shops	Cost/ Price	11 (31)	10 (36)	11 (35)	32 (34)
	Distance	6 (17)	6 (21)	3 (10)	15 (16)
	Quality	5 (14)	7 (25)	8 (26)	14 (15)
	Additional service	1 (3)	3 (11)	2 (6)	6 (6)
	Availability	12(34)	2 (7)	7 (23)	21 (28)
Total		35 (100)	28 (100)	31 (100)	94 (100)

Source: Own Survey, 2014.

In general, limited availability of the formal veterinary drug shops are the most pressing challenges in improving access to veterinary drugs to pastoralists in the three PRIME clusters. Thus, higher costs and limited availability of drugs in the formal channels might be major factors to the existence of the informal veterinary drugs marketing system in the pastoralist areas.

Many of the sampled pastoralists have indicated their preferences for the quality veterinary drugs from the formal drug shops such as wholesalers and retailers. However, lack of the formal drug shops in many of the remote locations of pastoralists may have encouraged the use of informally supplied drugs which are available in their surroundings. This also does not mean that all pastoralists always prefer buying the veterinary drugs from the formal drug shops. For example, around Moyale some pastoralists stated that they feel drugs crossing the border from Kenya are effective in treating their livestock. Some also stated that drugs which cross the Kenyan border are supplied in small sized bottles and packs which do not force them to incur higher costs because of buying big packs in a single purchase.

Significant proportion of sampled pastoralists indicated that quality of the veterinary drugs makes the formal veterinary shops their first level ranked preference. This means that pastoralists strongly believe in general that quality drugs are offered by the formal drugs shops as compared to that of the informal ones. But problems related to the availability of drugs and long distance issues were mentioned as the least benefits of buying drugs in the formal drug shops. This may mean that problems of access and availability to the formal drug shops might be among the factors that force pastoralists to consider informal drug sellers as alternatives.

Further awareness issues about the nature of the drugs circulating in formal drugs shops versus those coming through the informal channels still need to be extensively clarified for pastoralists. But supply of drugs through the governmental animal health services channels in some of the PRIME clusters is indicated to last only three to four months in their respective region. This means that pastoralists surely will be forced to look for other sources to fill the demand gap created for the veterinary drugs.

In order to understand pastoralists' pattern of sources of their veterinary drugs purchase, respondents were asked to rank their respective experience of buying drugs from public animal health centers/shops, private animal health center/shops and informal drug markets (Table 3). For the purpose of this study, we considered all veterinary drugs sold at open markets and villages other than public and private drug shops as informal drug market. Accordingly, majority of pastoralist both in Afar and Southern cluster often buy drugs from public animal health centers/shops with 42.5% and 44.0% response rates, respectively.

Pastoralists relatively less often buy drugs from the informal drug markets across all the clusters, but slightly higher at Afar cluster (27.5%). This may be due to the fact that private drug shops are relatively scarce in Afar than other clusters.

Table 3. Pastoralists' experience of buying veterinary drugs

Source to buy drugs	Cluster of the area			Total (%)
	Afar	Eastern	Southern	
	Number (%)	Number (%)	Number (%)	
Public animal health centers/shops	17 (42)	14 (35)	18(44)	49 (40)
Private animal health centers/shops	12 (30)	19 (47)	16(39)	47 (39)
Informal drug markets	11 (28)	7(18)	7(17)	25 (21)
Total	40 (100)	40 (100)	41(100)	121 (100)

Source: *Own Survey, 2014.*

The trust level of the pastoralists also varies across the market channel actors for the veterinary drugs (Table 4). To this respect, out of the 120 pastoralists who indicated their response, 66 percent of them indicated that they trust governmental animal health centers to buy veterinary drugs. But the trust level of the pastoralists to buy veterinary drugs from the informal drug sellers is almost equal to that of CAHWs. This may mean that informal drug sellers might be considered as CAHWs in the villages.

Table 4. Trust level of pastoralists to main marketing actors to the veterinary drugs

Veterinary drug seller	Frequency (%)
Governmental animal health center	80 (66)
Private drug shops	23 (19)
Informal drug sellers in the village or market	9 (7)
CAHWs	8 (7)
Total	120 (99)

Source: Own Survey, 2014.

The higher trust level to the governmental animal health center might be also related to the incidence that pastoralists might have faced while using the drugs from other sources. Pastoralists associated the death of their livestock as a result of 'wrong' drugs largely to the private and informal drug shops (See Table 5).

Table 5. Pastoralists' perception on the source of drugs that caused livestock death

Source	Cluster of the area			Total (%)
	Afar Number (%)	Eastern Number (%)	Southern Number (%)	
Private drug shop	5 (38)	4 (100)	8 (57)	17 (55)
Government animal drug centers	2 (15)	0	2 (14)	4 (13)
Informal drug market	6 (47)	0	3 (21)	9 (29)
Don't remember	0	0	1 (8)	1 (3)
Total	13 (100)	4 (100)	14 (100)	31 (100)

Source: Own Survey, 2014.

In terms of the source of the drug that pastoralists believe to have caused the death of their livestock, 38%, 100% and 57% of the drug were purchased from private drug shops in Afar, Eastern and Southern cluster, respectively. This finding strengthens the claim that some of the drug shops actually keep mix of illegal/expired drugs with formal and genuine drugs in their shop. 47% of the presumed wrong drug was purchased from informal drug markets in Afar cluster while it is 21% in Southern cluster. In actual fact the cause of the livestock death to pastoralists as a result of wrong drugs might be also related to their lower level of awareness on the nature of the veterinary drugs. In this respect, only 39 (32 percent) of pastoralists did indicate that they had adequate knowledge on the nature and use of the veterinary drugs. The remaining 80 (66 percent) indicated that they did not have knowledge on the nature and use of the drugs.

#### 4. CONCLUSION AND RECOMMENDATIONS

##### 4.1. Conclusion

This study analyzed the marketing system of the veterinary drugs in the three PRIME clusters. The existing marketing system is largely un-integrated because long term-contractual relationships between the wholesalers and retailers in the central market (Addis Ababa) and that of veterinary drug shops in pastoralist areas are non-existent. In this regard, the supply of the veterinary drugs to pastoralists in three clusters seems that the demand and the supply are not in par. At present, significant proportion of

pastoralists were using informally circulating drugs because the formal shops were not easily accessible to pastoralists. Future efforts that aim to minimize the flow of the informal veterinary drugs need to emphasize on increasing the coverage and accessibility of the formal drug shops to pastoralists. Easy access of pastoralists to the formal drug shops can balance the demand from the pastoralists and hence minimizing their involvement to buy from the informal veterinary drugs marketing system. The fact that significant proportion of pastoralists believes that quality veterinary drugs are provided by the formal drug shops might help in sensitizing the negative impacts of the informal drugs. There are huge opportunities to the marketing system for the veterinary drugs because the use of the drugs by pastoralists is relatively increasing from time to time. However, still there are challenges to the marketing system of the veterinary drugs as a whole, including but not limited to, poor follow up after licensing of drug importation and lack of post-import random testing of drug quality which allowed the existence of legally imported low-quality drugs and unfair participation and competition of importers in wholesale and retail businesses for the veterinary drugs (in central markets).

#### 4.2. Recommendations for Policy Consideration

In light of the above conclusions, the following policy recommendations were made. These include:

- ◆ Increase awareness on the nature and use of veterinary drugs to pastoralists;
- ◆ Increase post-import veterinary drug inspection;
- ◆ Delineate role boundaries of the veterinary drug marketing actors;
- ◆ Co-finance the establishment of veterinary drug wholesalers in pastoral regions;
- ◆ Strengthening CAHWs by upgrading into cooperatives;
- ◆ Standardizing packaging and labeling for veterinary drugs;
- ◆ Integrated support by stakeholders for CAHWs and pastoralists in veterinary drugs; and
- ◆ Capacity building to Veterinary Drug and Animal Feed Administration and Control Authority.

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## CLIMATE CHANGE RELATED HAZARDS, EARLY WARNING INDICATORS AND, USER CLIMATE FORECAST INFORMATION REQUIREMENT IN AFAR, OROMIA, AND ETHIOPIAN SOMALI PASTORALISTS

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### EXECUTIVE SUMMARY

*Access to climate change information and early warning advisory is critical to build the adaptive capacity of rural communities. In the absence of scientific climate change-related forecast information, the pastoral and agro-pastoral communities and local business depend heavily on traditional climate forecast made using different climate change hazard and early warning indicators. However, the gradual decline in forecasting ability of forecasters and religious discouragement increased the demand for scientific information on climate forecast and early warning advisory. The Ethiopian National Meteorology Agency (ENMA) can assist pastoralists and agro-pastoralists through provisions of climate forecast and early warning services.*

*This study was conducted to document the traditionally used climate change hazards and early warning indicators, identify climate forecast information and early warning advisory requirements, and evaluate the status of ENMA's climate forecast services in meeting user requirements in Somali and Afar regions, and Borana zone of Oromia region. Data were collected through focus group discussion, key informant interview, and dialogue. Twenty focus group discussions were conducted by disaggregating the community based on three livelihoods (pastoral, agro-pastoral, and local business). Dire, Taltale, and Moyalle from Borana zone, Gewane, Amibara, and Awash Fentale from Afar, and Harshin, Kebribeyah, Afdem, and Mulu from Somali were the districts included in the study.*

*The results indicated that although ENMA was preparing seasonal forecast for the studied regions, the information was not cascaded down to the pastoral and agro-pastoral communities. The major climate change-related hazards affecting the community were heat, drought, flood, erratic and heavy rainfall, pests and diseases, and wind. Local communities use different indicators (cultural, environmental, meteorological, and astronomical) to predict hazards. Accuracy of traditional forecasts was declining as the rapid change in weather challenged the forecasting ability of forecasters and religious discouragement of traditional forecast. As a result, the community demanded for location- and time-specific, and accurate enough (which ranged from 60-100%) scientific climate forecast information from ENMA. The time frame demanded by the pastoralists and agro-pastoralists was up to two months ahead and maximum of four months in advance in most cases. Information on diseases and pests occurrence, heat stress, and erratic rainfall are more needed by agro-pastoralists,*

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*whereas the business persons firms required information on drought, rainfall pattern and volume, and diseases and pests. If bad scenarios are forecasted, destocking, mobility, diversification of livelihood, variety selection and food aid request are some of the decisions that will be taken by the community in the study areas. Training of trainers to district experts was suggested to provide the right information with good advisory service to the community. For the ENMA services and products to have an impact on pastoral livelihoods, responsibilities cannot stay solely in the hands of the ENMA; there needs to be cross-sectoral communication and development that links the impact of the climate forecast and warning across the various sectors*

## 1. INTRODUCTION

It is inevitable that climate change caused challenges to livelihood of major Africans, who depend on natural resources for their livelihood activities. Pastoral, agro-pastoral, and farming livelihoods are climate-sensitive as climate is one of the major inputs for the production and productivity of livestock and crops. Climate will seriously aggravate the impacts of current challenges in the drylands. Of all the natural resource-based land uses in the dry lands, pastoralism functions better within the context of wide rainfall variability and unpredictability. It therefore presents a more logical adaptation route than livelihood activities and land uses which do not have the advantage of mobility (Nori and Davies, 2006). Eleven million of the 35 million cattle and of 42 million sheep and goats in Ethiopia, 18 million are kept by pastoralists in the drylands (Simpkin, 2005).

Slight increase in temperature has huge consequences in such areas as it contributes to climate change-related hazards such as drought, pests and diseases, water shortage, and imperfect hydrological cycle. Pastoralists have been applying different kinds of coping and adaptation strategies which are born out of necessity to counteract the impacts of climate change. However, most of the strategies have not been effective as there were no well-defined ways of their application, and they are also applied once the hazards caused huge damage. Limited efforts exist in preventive /mitigation/ measures in the area although there is lack of early warning provision for the pastoralist communities. Early Warning Systems (EWS) are monitoring devices designed to avoid or minimize the impact imposed by a threat on life, property, environment or livelihoods (Cetina and Nadime, 2008).

According to Teshome (2012), scientific early warning systems do not adequately exist in Ethiopia, or are ineffective, or break down at critical points – risking devastation, death, and destitution. The existing scientific warning has been criticized for being too complex and resource intensive that requires skilled staff at all levels and requires efficient communication channels, which is lacking in most parts of Ethiopia; not suitable for pastoral and agro-pastoral areas in Ethiopia; and lack of baseline (contextual) information. Early warning information is widely recognized as worthwhile and necessary in improving resilience to natural and man-made hazards and protecting economic assets and development gains. It helps society adapt to and defend against the uncertainties of climate change mainly if it is developed taking the available resources into account.

Pastoralists' Resilience Improvement through Market Expansion (PRIME) is working to enhance pastoralist's adaptation to climate change through improving this ill-functioning early warning information system. As part of the strategy, PRIME intends to work with Ethiopian National Meteorology Agency (ENMA) to try to improve local weather and climate forecasting capacity and delivery forecast services to local producers and businesses in PRIME operational areas. In order to tailor the production of climate/weather forecasts to the information needs of communities and businesses, PRIME intends to

support the ENMA forecast validation process with user-based assessment of major climate and weather related extreme events, community and resource vulnerabilities, early warning and disaster information needs. The user-based assessment gives a true reflection of the forecast and warning information end-users perception of products and services provided by the ENMA, as well as qualitative information on desired products and services. Haramaya University (HU), one of the consortia of PRIME, conducted study on the user-based ENMA climate/weather forecasts and warnings needs in Oromia, Somalia, and Afar pastoral areas.

PRIME intends to work with ENMA so as to try

1. To improve local weather and climate forecasting capacity and
2. To deliver forecast services to local producers and businesses people in PRIME operational areas

Given the objective of PRIME, this study was conducted to:

1. Identify major climate related hazards in the PRIME target areas;
2. Identify traditional early warning indicators; and
3. Analyze user-based ENMA's climate/weather forecasts requirements and warning needed in PRIME operational areas.

## 2. METHODOLOGY

Haramaya University together with CARE (Cooperative for Assistance and Relief Everywhere) (climate change and natural resource management lead institute in PRIME) selected a total of eleven districts, namely, Afdem, Mulu, Kebribeya, and Harshine from Somali region; Moyale, Taltale, and Dire from Borana zone of Oromia region; and Awash Fentale, Amibara, and Gewane from Afar region for the assessment. The assessment was conducted by disaggregating the community based on three livelihoods (pastoral, agro-pastoral, and local business) taking gender into account. It was also tried to capture the climate information needs of government sectorial offices such as Disaster Prevention and Preparedness bureau (DPP), Water bureau, Pastoral Development Bureau (PDO), Information and Communication Bureau, and Agricultural and Rural Development Bureau (ARD). The data was collected from focus group discussion with pastoral and agro-pastoral livelihood leading communities at *kebele* level for each selected district, Key Informant Interview (KII) with district experts and local business groups, and Dialogue with district higher officials such as head of local administration, agricultural and rural development office, Water Bureau, Women's affairs, Communication office, and community elders. There were three dialogue workshops conducted at Dire, Awash Fentale, and Afdem districts representing the Borana zone, Afar and Somali regions, respectively. A total of 20 focus group discussions, each group containing 10-12 participants, were conducted. The FGD was evenly disaggregated among gender, and livelihood (pastoral, agro-pastoral, and local business) to explore the different information needs. Efforts were also made to represent different age groups (18-60) in the discussion. The dialogue had three major purposes, namely awareness creation about early warning information, collective validation of the ENMA services, if there is any, and creation of a good platform for gathering climate information needs. The team conducted an extensive literature review on existing documents related with early warning information, climate hazards and trends (including reviewing PRIME CVCA reports), communities livelihood strategies, resource management practices and response strategies in pastoral areas of Ethiopia.

### 3. RESULTS AND DISCUSSION

#### 3.1. Overview of Role of ENMA and Communities Responses on NMA's Seasonal Forecast and Warnings in PRIME Working Areas

The ENMA focuses more on the highlands of the country where crop production is common and branch offices are skewed towards these areas. There are limited stations in pastoral and agro-pastoral regions. Besides, most stations are located in cities and towns along main roads, which limits the availability of climate information and services for rural communities. Even existing records have data gaps and quality problems and often not easily accessible. The ENMA prepare seasonal forecasts for regions such as Oromia, Afar, and Somalia where pastoral and agro-pastoral livelihoods are dominant. The agency produced seasonal forecasts and outlooks at regional level and tries to disseminate the information to National Sectorial Offices through workshops and publications such as, Agro-meteorology, Hydro-meteorology, and Health Bulletins. However, the information did not reach the pastoral community and district bureaus up to the date of data collection since there was no effort from concerned regional bureaus to cascade it down to the district levels.

The communities never received any kind of seasonal forecast or warnings except the general weather forecasts of different cities broadcasted through the National Television and Radio on daily basis. Even the forecasts aired are city-oriented and for short term that does not have any use for the pastoral and agro-pastoral communities whose demand is more space and time specific. In some districts of the assessment, the communities indicated that they never heard of the ENMA services and products before. As a result, they do not have any kind of knowledge and experience in the use of seasonal forecast as they have never received any climate information before, and any kind of awareness or training from the agency.

In spite of the absence of weather/climate information and advisory service provision to the local pastoral and agro-pastoral communities, there is willingness from these communities to pay for ENMA service as it can save them from the risk of climate change hazards. However, their payment is based on the accuracy, specificity and timeliness of information disseminated to them.

#### 3.2. Climate Change Related Hazards

The community has been affected by various climate change hazards, namely, heat, drought, flood, erratic rainfall, pests and diseases, heavy rainfall, and wind. Drought, and pests and diseases were identified to be communities' first and second priority problems, respectively. These hazards have the highest magnitude of impacts on community's livelihood resources, and occur very frequently. For instance, in most cases drought was responsible for 75% livelihood asset loss, whereas pest and disease brought about 50% loss. They were commonly happening at least once in two years of time in the study areas during the last decade. On the other hand, wind, heavy rainfall, conflict, and flood were identified as hazards occurring very rarely in few places such as the Harshin district of Somali region and, hence, their impact was not pronounced as such. The hazards have similar incidences and impacts regardless of livelihood type, gender, and region. However, a few hazards such as heat stress, pests and diseases, conflict, and flood have impact differences. For instance, heat stress is reported to have more serious impact on the agro-pastoralists than the pastoralists. One of the main reasons could be related to the fact that the agro-pastoralists sedentary way of life restricts their movement to other areas in case of strong heat wave incidences. Pests and diseases were also reported to be very serious hazards in agro-pastoralist than pastoralist areas. This may be related to lack of experience to manage crop diseases and pests as agro-pastoralism is a very recently introduced livelihood activity in the pastoralist areas. Diseases and pests are

also reported to happen every year in Dire and Moyale districts of Oromia, whereas in Mulu of Somali it is perceived to occur once in more than three years. Conflict, which is mainly caused by natural resource competition, is a very serious issue happening at least every year in Moyale district of Borana, Afdem-district of Somalia, and Amibaradistrict of Afar, and it's responsible for human killings, asset distraction, and lootings. In Moyale, there was a conflict between Borana and Gebera Oromo clans. This conflict was even going on during this survey period in May 2014. There was also a long-standing conflict between Afar and Isa clan of Somali as per the discussion held with the community indicates.

The community perceived that there will be more hazard impacts in the future given scarcity of pasture and water for their livestock; unless appropriate intervention is made. They also believe that heat intensity, number of hot days and erratic rainfall will increase and rainfall volume will decrease in the future aggravating the climate change related hazards.

District experts' perception on past extreme events and current climate hazards ranked drought first (70%) followed by pests and diseases (40%) (Table 1). Conflict was mentioned as third priority problem followed by flood, while invasive weed species, such as *Prosopis juliflora*, and wind erosion were mentioned as being additional threats.

Table 1. Hazards identified and their priorities as set by community members in the study areas

Hazard type	Rank of a hazard ( total number of FGDs is 20)					
	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>	NA
Drought	13	7	0	0	0	0
Flood	0	2	2	2	5	9
Erratic rainfall	2	0	3	6	1	8
Pestsanddiseases	1	6	6	6	1	0
Heat stress	1	1	1	5	8	4
Heavy rainfall	0	1	1	1	0	16
Conflict	1	4	2	0	0	13
Wind	1	0	1	0	0	18

Source: own survey (2004).

### 3.3. Traditional Indicators for Predicting Hazards, their Effectiveness, and Dissemination Mechanisms

#### 3.3.1. Traditional indicators of hazards

In response to absence of scientific information forecasting, the community has developed early warning system which bases traditional knowledge to forecast potential hazards and counteract their impacts. Traditional knowledge is generally defined as the "Knowledge of people of a particular area based on their interactions and experiences within the area, tradition, and their incorporation of knowledge emanating from elsewhere into their production and economic systems" (Boef *et al.*, 1993). This knowledge and skills has accumulated overtime and handed down from generation to generation orally. The knowledge is evolved by locally defined conditions and needs. The community knows a wide range of traditional indicators some of which follow certain universal principles or logics, others base on correlation, and majority base on local experience without scientific bases.

In the study areas, different indicators were used by the local community for forecasting hazards (Table 2). The indicators can be grouped into four categories: cultural, environmental, meteorological, and

astronomical. Astronomical observation, wind direction, animal behavior, animal intestine, and starting day of a new year are mostly used by the community, whereas the rest are rarely used. However, the indicators used by most members of the communities have relatively low level of accuracy ranging from 52 to 92% compared to those least used whose accuracy, as perceived by the community, is more than 90% (Table 2). Among those commonly used, the indicator with highest level of accuracy was 'Starting day of a new year (92%) and the least was the 'astronomical observation' (52%). A brief description of the most commonly used indicators is provided below.

Table 2. Traditional indicators, with their accuracy level, for predicting hazards

Traditional indicators	No. of FGDs using the indicator	No. of FGDs not using the indicator	Average accuracy (%)
Astronomical observation	17	3	52.0
Wind direction	8	12	84.0
Animal Behavior	8	12	72.7
Animal Intestine	5	15	54.6
Starting date of a year	5	15	92.0
Termite infestation	1	19	98.0
Tortoise leaving its hole	1	19	97.8
Stone count	2	18	91.0
Witchcraft	1	19	100.0
Analog year	1	19	5.0
Cloud pattern	1	19	95.0
Flowering of acacia plant	2	18	96.0
Ground water	1	19	5.0
Spider net	1	19	5.0
Night weather	1	19	98.0
Earth crack	1	19	94.0
Tracking of crop growth	1	19	5.0

Source: Own Survey, 2014.

**Astronomical observation:** Elderly people in the community forecast hazards by looking at the movement and orientation of the moon and the stars in the sky. It is the most commonly used indicator. Most of the women do not have much information, knowledge, and skills about the astronomical indicator.

**Wind direction:** It is the second most frequently used indicator next to the astronomical indicator. People use the direction of wind blow to predict about rainfall and drought. Wind blowing from the East and South indicates occurrence of rainfall, while wind blowing from West and North implies drought. But for Kebribeya community wind blowing from West to East implies on set of rainy season. Hazard forecasting using wind direction is mostly used in Somali region.

**Animal Behavior:** This is also one of the most frequently used indicator after the astronomical observation and wind direction indicators. When drought is about to come, cows start to eat animals' carcasses; Hayne doesn't bark at night, and it also stops consuming carcasses. Animal salivation and rolling of unmated sheep are signs of upcoming rainfall. Birds' squeak is also another important indicator of rainfall. According to the community, when something bad is going to happen, livestock are crowded together and refuse to go to watering points.

**Animal intestine:** As per the experience of the community in the study areas, the intestine of animals could help to predict various hazards including rainfall shortage, drought, pest and disease prevalence, conflict, and even death of a human being. They use different animal intestines to make short-and long-term predictions. For instance, to predict hazards coming shortly, goat's intestine is used and, for long term prediction which is eight and more year, cattle's intestine is used. This indicator is mostly used in Oromia region.

**Starting Date of a New Year:** Most of the *woredas* where this assessment is conducted are Islamic religion followers and they use the Hijra calendar system, which focuses on Moon as the center of the system, for performing religious activities. According to them, if the first day of a new year is on Saturday, Sunday, or Wednesday, then hazard is expected. Except Harshine for Friday, all the other participants agreed that a new year falling on all the other days implies a good year. This indicator seems to be unique to Somali region.

**Other indicators:** the community also uses a lot of other indicators, such as analog year, ground water level, cloud pattern, stone count, earth crack, spider net, night weather, cultural (witchcraft), and flowering of a plant to forecast a range of impacts. Even though these indicators are not known much and used, some of these indicators have better scientific backup than those commonly used by the community. Prediction using analog year, cloud pattern, ground water level, flowering of a plant, and night weather can be justified scientifically. For instance, analog year is used by ENMA to prepare climate/weather forecasts.

It is important to note that 58.8% of the short-listed traditional indicators had a level of accuracy that is greater than 80%. This clearly indicates the extent to which the local community relies on traditional predictors for forecasting hazards. Nevertheless, these levels of accuracy should be validated using the scientific forecasts for better prediction of hazards in the future.

### 3.3.2. Effectiveness of the traditional forecasts

The community used to trust highly the traditional forecasting and had been beneficiaries of the information by considering it in their decision making process. However, the trustworthiness of the traditional forecasting has eroded overtime as religious leaders started to challenge the practice; and some forecasts failed because of climate change and other factors. For instance, using a starting day of a new year to predict drought is no more a reliable indicator as drought is happening every year regardless of the day a new year is starting. But there is still a chance to win back the trust of the community by creating awareness on religious leaders, government officials, and communities that traditional forecasting bases knowledge, skills, and experiences and, hence, should not be considered as a sinful act.

### 3.3.3. Traditional forecast information dissemination mechanisms

The communities have inbuilt traditional communication systems through which important information is shared within and across communities. For instance, in Afar and Oromia regions the communication systems are locally called *Dagu* and *Adamtu*, respectively. In these communities, it is a culture for people to exchange information whenever they meet. The beauty of these communication systems is that prior acquaintance of the communicators is not a precondition to exchange the information. Language is the only thing that matters most to convey the information. There is a similar culture of communication in the Somali region as well.

Traditional climate forecasts and warnings information is mainly communicated to the community through these traditional communication systems. Forecasters tell the forecast to their family, close



relatives, and to the people around them. Those people who get the forecast information disseminate to the rest of the community through the traditional communication systems. Individuals interested in climate forecast can also approach forecasters and get the information they need. The decision to use the information lies in the hands of the community. Those who trust the information apply it for their livelihood decision making. Forecasters do not ask anything in return from the community and this makes them unaccountable for any kind of forecast failures.

### 3.4. Integrating Traditional and Scientific Forecasting

Traditional forecasting has major flaws such as low accuracy, less trust, less area coverage, not sustainable in nature, and limited communication to end users (Table 3). Scientific forecasting has also drawbacks such as its being too aggregated to be relevant, resource intensive, and time taking. For getting combined and effective benefit, bridging the gap between the two knowledge systems should be done through intensive dialogue between scientific and traditional knowledge providers, and user groups. This can be achieved through exploiting the existing opportunities. The result of SWOT analysis for traditional indicators of climate forecasts is presented in Table 3. Working on the weaknesses and exploiting the available opportunities can enhance integration of the traditional forecast with the scientific one for better results.

Table 3. SWOT analysis of traditional indicators of climate forecasts

Strength	Opportunity
<ul style="list-style-type: none"> <li>◆ Locally available</li> <li>◆ Does not cost too much</li> <li>◆ Hazard specific</li> <li>◆ Area specific</li> <li>◆ Not limited to climate change related hazards only</li> <li>◆ Used to predict death, security, marriage fate, and others</li> </ul>	<ul style="list-style-type: none"> <li>○ CARE is involved in Southern and Afar clusters in assisting traditional forecasting.</li> <li>○ Government offices are taking training on traditional early warning system.</li> </ul>
Weakness	Threat
<ul style="list-style-type: none"> <li>◆ Very low accuracy</li> <li>◆ Knowledge and skill of prediction is highly restricted.</li> <li>◆ Not sustainable</li> </ul>	<ul style="list-style-type: none"> <li>○ Climate change: frequent hazard occurrence confused the traditional forecasters</li> <li>○ Religion: only Allah knows</li> <li>○ Conflict and natural death</li> <li>○ Restricted knowledge and skills transfer based on blood line</li> </ul>

### 3.5. National Meteorology Agency Services Requirements

Information on drought, flood, pests and diseases is highly required by all pastoralists in the studied areas. Similarly, all the agro-pastoralists in the study areas demand information on drought and, rainfall pattern and volume. On the other hand, the information requirements on the other major hazards identified varied within a cluster and among clusters (Table 4), and between livelihood activities. The climate forecast information required by majority of the local business firms is on drought (89%), rainfall (78%) and, pests

and diseases (56%) (Table 5). This indicates that these are the climate-related hazards that affect decision making on their livelihoods the most. Flood, heat stress, and wind were the other hazards know to have an effect on the local business firms albeit to a lower degree. The time frame for the forecast required by the local business firms ranged from one month to seasonal with most of them demanding forecast on three months basis.

The community grouped the forecasting time into four categories. These are up to two months before the hazard, between two to four months before the hazard, more than four months with maximum period of 12 months, and not applicable categories for those who do not require information on specific hazard. The format preferred for climate information delivery system includes through extension agents (both development and health extension workers), radio service, mobile phone, both extension and radio, and combination of extension agent, radio, television, and mobile (Table 6). The community in different clusters/regions preferred their own language as media of communication.

Table 4. Climate forecast/early warning information requirements of pastoralists and agro-pastoralists in the study areas.

Type of information required	Region/zone	Pastoralist (10 FGDs) requiring (yes) and not requiring (no) the information		Agro-pastoralist (10 FGDs) requiring (yes) and not requiring (no) the information	
		Yes	No	Yes	No
Drought	Borana	100	0	100	0
	Somali	100	0	100	0
	Afar	100	0	100	0
Flood	Borana	100	0	100	0
	Somali	100	0	75	25
	Afar	100	0	100	0
Pests and diseases	Borana	100	0	67	33
	Somali	100	0	75	25
	Afar	100	0	67	33
Heat stress/ Temperature	Borana	33	67	67	33
	Somali	50	50	75	25
	Afar	33	67	67	33
Erratic rainfall	Borana	33	67	67	33
	Somali	25	75	25	75
	Afar	33	67	67	33
Heavy rainfall	Borana	0	100	0	100
	Somali	50	50	0	100
	Afar	0	100	0	100
Heavy wind	Borana	0	100	0	100
	Somali	50	50	0	100
	Afar	0	100	33	67
Rainfall pattern/ Volume	Borana	67	33	100	0
	Somali	100	0	100	0
	Afar	67	33	100	0

Source: own survey (2004).

Similar to the pastoral and agro-pastoral community, most (78%) of the local business firms also preferred the climate forecast information to be disseminated through extension agents followed by radio/TV in local language (Table 6). On the contrary, most experts (78%) want the forecast and early warning information to be disseminated through printed materials followed by through community meetings (50%) and a meteorologist at district or even *kebele* level (40%) (Table 8).

Table 5. Local businesses' climate information requirement and proposed time of delivery

Type of information needed	How long in advance (in months)							Percentage
	1	2	3	4	5	6	Seasonal	
Extreme drought	-	3	2	-	-	2	1	89%
Rainfall	-	2	2	1	-	-	2	78%
Flood	-	1	1	-	-	-	-	22%
Impeding pests and diseases	-	1	3	-	-	-	1	56%
Wind strength	1	-	-	-	-	-	-	11%
Heat stress	1	-	-	-	-	-	1	22%

Source: own survey (2004).

Table 6. Preferred dissemination Channels for climate information delivery

Dissemination Channel Preferred	No. of Business Organizations	Percent from total businesses identified
Printed materials in local language	2	22%
Extension agents	7	78%
Radio/ TV in local language	4	45%
Mobile (calls, texts) in local language	2	22%

Source: own survey (2004).

The pastoral and agro-pastoral communities in the study areas also described the level of accuracy of climate forecast and early warnings information provided by the ENMA that they will consider to be of some use and be very useful (Table 7). From the 'be of some use' group, majority (33%) of the pastoral and agro-pastoral communities need the information to be of 70% accurate. On the other hand, for the climate forecast information to be considered 'very useful, about 56% of the community demanded for 90% accuracy.

Table 7. Accuracy of the ENMA weather forecasts required for use in decision making

Level of accuracy (%)	Be of some use		Be very useful	
	Count	%	Count	%
50	2	22	1	11
60	2	22	0	
70	3	33	1	11
80	1	11	1	11
90	1	11	5	56
100	0	0	1	11

Source: own survey (2004).

Table 8. Experts' preference of climate information dissemination mechanism

Preferred Dissemination Channel	Responses from Sectoral Experts	
	Counts of YES	Percent from total Woredas in the KII
Printed materials	8	80 %
Recruited meteorologist at Woreda Levels	4	40 %
Community meetings	5	50 %
NGO's	2	20 %
Focal Person at Woreda Levels	3	30 %
Internet (e-mail)	2	20 %
Traditional Networking Systems	2	20 %
Climate Desk at Woreda Levels	3	30 %
Mobile phone (Calls, and Texting)	3	30%

Source: own survey (2004).

### 3.6. Decision to be Taken by Community Based on Reliable and Timely Information from ENMA

The community in the study area stated what they could do if they get accurate forecasts about the future climatic conditions. They mentioned as they first pray to God for better situation. If bad scenario is forecasted destocking, mobility, diversification, variety selection and food aid request will be considered, while during better scenario expansion of agricultural land and purchasing animals for better production will be sought (Table 9). Dawit *et al.*(2008) cited in Magda *et al.* (2009), reported that study undertaken in Ethiopia during the 2006 drought has shown that investments in helping overcome barriers to export, by tackling market access head-on, can yield much higher returns than supplying emergency food aid. This study demonstrated that it was 97 times more expensive to supply local food aid, and 165 times more expensive to supply international food aid, as opposed to helping overcome market barriers.

If accurate forecast and early warning information is provided, pastoralists and agro-pastoralists are ready to exercise destocking and the other above indicated strategies. In addition, different types of decisions can be made for resilience improvement to climate change/variability, such as water harvesting, storing available pasture, water rationing, migration, moving animals to hilly areas, etc.

The district officers also suggested training of trainers for district experts by regional meteorology so as to provide right information with good advisory service to the community (Table 10). Local business owners have also suggested mainstreaming of climate information into their business plan so as to make their business climate smart and sustainable.

Table 9. Type of decisions/strategies suggested by communities in response to ENMA Forecast.

		Type of decisions in percentage ( total number of FGDs is 20)																	
Region	Livelihood	Praying		Purchase animal		Expand agric.		Variety selection		Migration		Diversification		Destocking		Food aid		Drug purchase	
		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Borena	Pastoralist	0	100	0	100	0	100	0	100	67	33	67	33	67	33	33	67	33	67
	Agro-pastoralist	0	100	0	100	67	33	67	33	0	100	0	100	33	67	0	100	67	33
	Overall	0	100	0	100	33	67	33	67	33	67	33	67	50	50	17	83	50	50
Somali	Pastoralist	25	75	25	75	25	75	0	100	75	25	0	100	25	75	25	75	75	25
	Agro-pastoralist	50	50	25	75	50	50	0	100	25	75	0	100	75	25	25	75	25	75
	Overall	37.5	62.5	25	75	38	33	0	100	50	50	0	100	50	50	25	75	50	50
Afar	Pastoralist	33	67	0	100	0	100	0	100	67	33	33	67	67	33	0	100	100	0
	Agro-pastoralist	0	100	33	67	67	33	0	100	33	67	0	100	33	67	33	67	33	67
	Overall	17	83	17	83	33	67	0	100	50	50	17	83	50	50	17	83	67	33

Source, own survey (2004).

Table 10. Local governmental bureaus' decisions and advisories for potential below and above normal rainfall seasonal forecast

Woreda	Seasonal Forecast	Short term decisions		Long term decisions		Advisories
Dire	Below Normal Rainfall	Water awareness; conservation of pasture and water	rationing; mobilizing resources;	marketing resources;	Water harvesting; area enclosure (for dry season); training; re-settlement; Saving and credit; technology utilization; Sedenterization	Sow drought resistant crops; irrigation; destocking; moving animals to green areas; diversity livelihood; differentiate pond for animal and for human
	Above normal rainfall	Dike construction in case flood is a threat.	preparation or dam construction in case flood is a threat.			Breed your animals

Awash Fentale	<p>Below Normal Rainfall: <i>Afar community say that "pasture land is lost from failure of Sugum rain and People is lost from failure of Government"</i></p>	<p>Informing the problem to the concerned body; preparing feed; informing or warning the community; exploring areas with adequate pasture and water using "Edo" system; special follow up for children and pregnant women as they are affected much by scarcity of water</p>	<p>Settling conflicts between different clan groups so that the buffer zones will be used in case of hazards; starting the DRR and emergency program; resettlement; strengthening social networks</p>	<p>Selling animals with good price and sterile ones and purchasing feed for the rest of the animals; killing newly born animals; moving animals expect those pregnant and lactating; saving and credit; storage</p>
	<p>Above normal rainfall</p>	<p>Informing the community about the hazard so that they will harvest and store their crops in a good place; implement emergency activities such as dam construction for flood prevention; providing professional support to victims very closely.</p>	<p>Providing sustainable seasonal climate forecast for the community; providing training on prevention measures for key hazards like flood; implementing soil and water conservation</p>	<p>Harvest their crops; resettling to areas (peak places) where flood doesn't reach; moving animals to green areas</p>
Afdem	<p>Below NRF (Jilale season)</p>	<p>Water tracking; emergency (food, feed, medicine and drug provision, digging well, distribution of contingency ration, giving geomembrane, vaccination, agricultural tools, and drug etc); awareness; mobilization; resettlement to peak areas</p>	<p>Conflict resolution; re-settlement; nutrition; early warning; environmental conservation (afforestation, rehabilitation); resource saving; awareness creation regarding EWI and prevention measures; soil and water conservation; water harvesting (ponds &amp; Birka)</p>	<p>Destock and migrate to areas with better feed and water</p>

So far, Bureau of Disaster Preparedness and Preparation and Early Warning (DPPB and EW) at district level intervene to pastoralists' area not based on weather or climate information, rather based on filled information on checklist sent from regional office, visit made every month to pastoral areas by district higher officials and finally rectified by experts from federal level when potential hazard is reported. The role of DPPB and EW office is limited to intervention and do not have role on pre-emptive action in minimizing occurrence of climate related hazards.

### 3.7. Information Delivery Time, System and Accuracy

District experts provide advisories for the communities, solely based on their previous experiences on how the seasons turned out to be. It is imperative to build the capacity of the district sectorial experts to understand, demand, and use climate information and services. Hence, awareness and training for experts to coordinate among relevant sectorial departments for better exchange of climate information should be looked into.

ENMA forecast based on three main seasons namely, *Bega* (October to January), *Belg* (February to May) and *Kiremt* (June to September) (ENMA, 2015). The seasons of pastoralists are four, which is different from ENMA's season of forecasting. Hence, adjustment of seasonal forecast based on pastoralists' season will help the pastoralists to adjust their decision as per the forecast. Seasons of the pastoralists is depicted in Table 11.

Table 11. Seasons of pastoralists in the study area

Season	Type of season	Period
Afar (Awash Fentale)		
<i>Karma</i>	Main rain	July to August
<i>Jilal</i>	Long dry	Sept to February
<i>Shugum</i>	Short rain	March to April
<i>Hagay</i>	Short dry	May to June
Somali (Afdem)		
<i>Keren</i>	Main rain	August to October 15
<i>Jilal</i>	Long dry	October 15 to March 15
<i>Drea</i>	Short rain	March 15 to May
<i>Hagay</i>	Short dry	June to July
Oromia (Dire)		
<i>Gena</i>	Main rain	March 20 to May 20
<i>Adolesa</i>	Short dry	May 20 to September 20
<i>Hagay</i>	Short rain	September 20 to November 15
<i>Bona Hagaya</i>	Long dry	November 15 March 20

Source: own survey (2004).

## 4. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The study revealed that climate change related hazards are common in the lowland of PRIME target areas (Afar, Southern and Eastern cluster). The pastoral, agro-pastoral and local business persons in the study area were suffering from climate related disasters. There is no climate information disseminated in user friendly way to communities in the lowlands of Ethiopia. Pastoralists use forecast information from

traditional forecasters which is not as such accurate and communicated. ENMA provides climate information referring on major cities; which do not help the pastoralists located far away from major cities in the country.

Hence, to strengthen the ENMA service in the pastoral and agro-pastoral communities of Afar, eastern, and southern cluster of PRIME target areas;

- ◆ ENMA should plan to provide seasonal climate forecast information for pastoral areas tailored to their local seasons and specific villages/grazing areas;
- ◆ Establish climate desk center at district level that give forecast and early warning information on time, training on awareness creation and interpretation of forecast information and that give advisory service to the ultimate user of the climate information;
- ◆ The community, government offices and ENMA should effectively make their contribution for eradicating poverty in pastoral areas through devising appropriate climate change mitigation and adaptation strategies;
- User-driven services and products: increasing the quantity and quality of meteorological products and services, focusing on the real needs of the users; facilitating dialogue and feedback information with the communities, allowing product improvement and usefulness of the products and information;
- ◆ Enhanced capacity of the staffs of the regional branch offices of ENMA: improving the skills of the professional and technical staff of the branch offices in pastoral areas, to design and implement continuous improvement of products and services and incorporating quality assurances in the process;
- ◆ Strengthening the operational observing and monitoring capacity of the ENMA: establish more automatic weather stations in pastoralist areas, combining and using the ground-based data with satellite data, and conducting further studies on traditional indicators commonly used and perceived to have better accuracy; and
- ◆ A major recommendation was the implementation of a Public Weather Services Unit, to act as the interface between the meteorological service providers and users for the development and implementation of user specified products and services of high impact.

In nuts shell, for the ENMA services and products to have an impact on pastoral livelihoods, responsibilities cannot stay solely in the hands of the ENMA, there needs to be cross-sectoral communication and development that links the impact of the climate forecast and warning across the various sectors.

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#### 6. ACKNOWLEDGMENT

The authors deeply acknowledge Mr. Ephrem Mamo, an Agro meteorologist, for his professional contribution and active involvement in the research. The respondents and district officials who assisted us in accomplishment of this study deserve appreciation. USAID through PRIME, who sponsored this study also deserve thanks as without their fund the study would have not been possible.

## CARBON STOCK OF SELECTED GRAZING SYSTEMS OF AFAR, OROMIA AND ETHIOPIAN SOMALI PASTORAL AREAS

Kibebew Kibret<sup>1</sup> and Tessema Toru<sup>1</sup>

### EXECUTIVE SUMMARY

*Pastoralism in Ethiopia is a direct source of livelihood to more than seven million people who live in the vast lowlands and drought-prone areas of the country. Despite living in the most fragile and degraded ecosystems, pastoralists and pastoralism made significant contribution to the national economy through livestock products. Climate change is predicted to have even a larger impact on these fragile ecosystems. On the other hand, the great potential of these lands for carbon sequestration was highlighted. Their management can help in mitigating climate change. Different rangeland management practices were tried over the years. Nevertheless, the impact of these management practices on the rehabilitation of degraded rangelands and their carbon stock has not been assessed quantitatively. The PRIME project has started implementing participatory rangeland management scheme in pastoral areas of Somali and Afar regional states, and Borana and Guji zones of Oromia region. It is imperative to have baseline carbon stock information to evaluate the difference this management scheme might bring about after five years. This study was conducted to achieve this grand objective.*

*The study was conducted in Ethiopian Somali (Harshin, Daketo, Mulu, and Afdem), and Afar (Mollale, Halydege, and Dudub) regional states, and Borana (Malbe and Dire) and Guji (Dida Dheda and Golba Genale) zones of Oromia Region. The baseline carbon stock was assessed based on measurements made on vegetation and soil samples collected from selected sites in grazing systems.*

*The mean terrestrial carbon stock (mean  $\pm$  std) of the studied grazing systems in Somali region ranged from 58.622 $\pm$ 9.296 t ha<sup>-1</sup> in Afdem to 160.536 $\pm$ 31.477 t ha<sup>-1</sup> in Mulu grazing system. The corresponding CO<sub>2</sub>e varied between 215.143 $\pm$ 34.118 and 589.166 $\pm$ 115.521 t ha<sup>-1</sup> in the same grazing systems. In Afar region, the carbon stock and its CO<sub>2</sub>e varied from 29.519 $\pm$ 17.771 and 108.335 $\pm$ 65.220 t ha<sup>-1</sup>, respectively, in Dubuluk grazing system to 45.628 $\pm$ 3.463 and 167.456 $\pm$ 12.708 t ha<sup>-1</sup> in Halydege grazing system. In Borana zone of Oromia region, the carbon stock varied between 60.962 $\pm$ 14.110 and 81.697 $\pm$ 20.248 t ha<sup>-1</sup> at Malbe and Dire grazing systems respectively. The corresponding CO<sub>2</sub>e were 223.729 $\pm$ 51.785 and 303.498 $\pm$ 74.312 t ha<sup>-1</sup>, respectively, for Malbe and Dire grazing systems. The carbon stock and CO<sub>2</sub>e of Dida Dheda, and Golba Genale were, respectively, 67.687 $\pm$ 17.585 and 248.411 $\pm$ 64.537, and 138.026 $\pm$ 11.350 and 506.556 $\pm$ 41.656 t ha<sup>-1</sup>. Comparison of the carbon stock in protected and unprotected grazing lands at Malbe and Dida Dheda grazing systems indicated that the contribution from*

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*herbaceous vegetation is higher in the protected than it is in the unprotected grazing lands.*

*The results obtained in this study suggested that management of grazing systems in pastoral areas could be among the options to mitigate climate change impacts as these areas are vast in their extent and have high potential to store carbon in live vegetation and soils.*

## 1. INTRODUCTION

### 1.1. Background

Livestock production, the main land use in pastoral areas and a source of livelihood for over one billion people (World Bank, 2007), can be found on two thirds of global drylands (Clay, 2004; Noriet *et al.*, 2005). About 60% of the 690,000 poor people living in sub-Saharan Africa rely on livestock production for some part of their livelihood (Thornton *et al.*, 2002). Livestock products, being the main outputs of grazing lands, have become among the fastest growing agricultural subsector globally. The World Bank (2007) report indicates that the contribution of the livestock sector accounts for 50-80% of some developing countries' GDP, while the share in sub-Saharan Africa is estimated at 12.5%. This indicates the social and economic importance of livestock to rural livelihoods, and, thus, the sustainable management of the natural resources base that supports them should stand high on the agenda.

Climate change, through its effects on desertification that has resulted in the loss of 12-18 billion tons of carbon, is predicted to have even a more significant impact on these impoverished and vulnerable but important ecosystems (Muñoz-Rojas *et al.*, 2012a; 2012b; 2013). It is anticipated that, if continued unabated, climate change and variability will continue to pose serious threats to the often vulnerable and impoverished people living in these hostile environments and their livelihood assets, the livestock. On the other hand, there are evidences (e.g. United Nations, 2011; FAO/LEAD, 2006; IPCC, 2007) that show that these areas might play a key role in mitigation of climate change effects through their great potential for sequestration of carbon in above and below ground pools.

As a result, the potential of extensive areas of semi-arid and arid rangelands to sequester C has been receiving increasing attention because of the very large global extent of such environments (Glenn *et al.*, 1993; Conant *et al.*, 2001; Howden *et al.*, 2001; Moore *et al.*, 2001; Burrows *et al.*, 2002; Dener *et al.*, 2006; Harper *et al.*, 2007). Efforts have been and are being made to estimate carbon sequestration potential of the drylands by several workers (Smith *et al.*, 2008; I.al, 2001, 2003, 2004; Campbell *et al.*, 2008; UNEP, 2008; IPCC, 2001; White *et al.*, 2000; Grace *et al.*, 2006; Squires *et al.*, 1995; Keller and Goldstein, 1998).

Pastoralism in Ethiopia is a direct source of livelihood to more than seven million people who inhabit the vast lowland and drought-prone territories, which make up about 40% of the total land area of the country (Helland, 2006). Given the size of the C pool in grazing lands, it is important to improve understanding of the current and potential effects of grazing land management on soil carbon sequestration and storage (Schuman *et al.*, 2002). Hence, there is a growing interest in assessing the carbon sequestration potential of grazing systems. Real and accurate carbon data is scarce. Much of the available data is often based on limited assessment of carbon stocks in a specified range unit, which fails to capture the spatial and temporal heterogeneity that characterizes pastoral ecosystems (Dabasso *et al.*, 2014). Presence of limited data on soil carbon sequestration potential of arid and semi-arid environments is an impediment to appropriate policy formulation directed at greenhouse gas abatement (Witt *et al.*, 2011). This study was conducted with the following main objectives:

- ◆ Assess the status of carbon stock of rangelands in PRIME intervention clusters and their contribution to climate change mitigation.

- ◆ Compare the carbon stock of selected managed and unmanaged rangelands and its implication to climate change mitigation, and
- ◆ Extract policy briefs that will direct policy makers on rangeland management in pastoralist areas for climate change mitigation

## 2. METHODOLOGY

### 2.1. General Description of the Study Areas

The study was conducted in selected PRIME intervention areas of East, Afar, and South clusters during 2014 (Figure 1). The East cluster is primarily found in Ethiopian Somali Region and Babile woreda of Oromia Region; the Afar cluster denotes the Afar Region and the South cluster encompasses pastoral areas of Borana and Guji zones of Oromia Region. From the East cluster, four grazing systems (Harshin, Daketo, Mulu, and Afdem) were selected. From the Afar cluster, three grazing systems, namely Mollale, Halydege, and Dudub were selected for the study. Similarly, from the South cluster Malbe and Dire from Borana zone, and Dida Dheda and Golba Genale grazing systems from Guji zone were considered. A grazing system is a unit of land that serves the pastoral community for dry and wet grazing seasons.



Figure 1. Location map of sampling sites at the different grazing systems in the three clusters.

### 2.2. Sampling Site Selection

Sites for collection of vegetation and soil samples were selected systematically in consultation with Governmental and Non Governmental Organizations (NGOs) operating in the study areas. The sample plots were located randomly after stratifying the grazing systems based on differences in topography and vegetation type. Since there were no grazing systems that were put under protection before this study in East and Afar clusters, only three sites from Borana and Guji zones were used for comparison of carbon stock under protected and unprotected grazing lands. One of these (Dida Haya in Sarite from Malbe) was under traditional system of rangeland protection called the *Kallo* system, while the remaining two (Andereka in Me'esa and Haro Arcero in Siminto) were under participatory rangeland management scheme for the last three to four years.

### 2.3. Field Layout, Vegetation, and Soil Sample Collection

A "nested" sampling approach (Hairiah *et al.*, 2011) was followed, assessing large diameter trees (with a stem diameter  $\geq 30$  cm) in rectangular plots of 100 m x 20 m, and trees and shrubs with DBH of 2.5-30 cm in subplots of 40 m x 5 m. Conservation method was employed for vegetation data collection. As there were no big trees with DBH  $> 30$  cm, samples were taken from a rectangular plot of 40 m X 5 m. All trees and shrubs with DBH and height of trees greater than 2.5 cm within the 40 m X 5m plot were recorded on pre-prepared registration sheet. A 1m X1m quadrat was laid at the four corners and center of the 40 m X 5 m plot for herbaceous, woody undergrowth vegetation, litter and soil sample collection. All herbaceous plants and woody undergrowth vegetation with DBH  $< 2.5$  cm were cut to the ground level and their fresh weight was measured together with litter collected from the same plot using weighing balance. A sub-sample of 300 g fresh mass was taken from the composite sample for laboratory analysis. The samples were oven dried at 105°C for 24 hours until the mass of the sample remained constant. The tree diameter was measured using caliper, while the height was measured using clinometer.

Soil samples were collected from 0-10, 10-20, and 20-30 cm depths and mixed thoroughly on an aluminum tray to make one composite sample per depth per plot. Accordingly, three composite samples were collected per plot for laboratory analysis of soil organic carbon. The collected samples were properly labeled and transported to Haramaya University Soil Science laboratory. The samples were then air-dried by spreading each on paper in a ventilated soil sample preparation room. The total mass of the air-dried samples was recorded before crushing the samples to pass them through a 2 mm sieve diameter. Visible coarse fragments, such as gravel, were separated before crushing the samples. Following this, the samples were gently crushed with mortar and sieved. The mass of the coarse fragments that did not pass through the 2mm sieve and those that were separated before grinding were recorded for each sample. Undisturbed soil samples were also collected from the respective depths using soil cores that were inserted into a metallic cylindrical core that is prepared for this purpose. For all the plots, the undisturbed samples were collected from centers of the plots only.

### 2.4. Data Analysis

#### 2.4.1. Estimation of above Ground Vegetation Carbon Stock

The following allometric equation was used to estimate the aboveground biomass and carbon stock of trees (Brown *et al.*, 1984):

$$ABGTB \text{ (kg tree}^{-1}\text{)} = \exp(-1.996 + 2.321(D)) \quad [1]$$

where: ABGTB = aboveground tree biomass; D = diameter of tree.

Then after, the carbon stock was calculated as:

$$C_{\text{stock}} = \frac{\text{Biomass}}{2} \quad [2]$$

#### 2.4.2. Estimation of Carbon Stock of Root Biomass

As suggested by MacDicken (1997), and Santantonio *et al.* (1977), the below ground root biomass of a plant is close to 20 percent of the total aboveground biomass. Accordingly, the root biomass of trees was estimated using the following formula:

$$BGB = 0.20 \times AGB \quad [3]$$

where BGB is below ground biomass, AGB is above ground biomass.

The total carbon stock of the vegetation was estimated as:

Total carbon stock = Carbon stock of above ground biomass + Carbon stock of below ground biomass

### 2.4.3. Estimation of Soil Carbon Stock

The soil organic carbon content was determined following the Walkley-Black oxidation method (Walkley and Black, 1934). The dry bulk density of the soils was determined using the core method as described in Blake and Hartge (1986) in which case the core samples were dried in an oven set at a temperature of 105 °C to a constant weight. The dry bulk density was calculated using the following equation:

$$BD(g/cm^3) = \frac{M_{ODS}(g)}{V_t(cm^3)} \quad [4]$$

where:

$M_{ODS}$  = mass of the oven-dry soil (g)

$V_t$  = total volume of the soil core calculated from:

$$V_t = \pi r^2 h$$

r is the internal radius of the cores measured using a caliber (cm), and h is height of the cores measured using a hand tape. After oven drying the core samples, any coarse fragment that did not pass through the 2 mm sieve diameter was separated and the fine earth (< 2 mm) weighed and used as mass of the oven dry soil.  $\Pi$  is a constant which is equal to 22/7.

The organic carbon content of soils obtained from laboratory analysis was used to calculate carbon stock per unit area of land. The carbon stock for each layer per hectare was calculated as:

$$C_i(ton/ha) = BD_i(1 - CF_i) \times d_i \times OC_i \times 10 \quad [5]$$

where:

$BD_i$  = bulk density of the  $i^{th}$  layer ( $i = 1-3$ ) ( $kg/m^3$ )

$CF_i$  = coarse fragment content of the  $i^{th}$  layer (fraction)

$d_i$  = thickness of the  $i^{th}$  layer (m)

$OC_i$  = organic matter content of the  $i^{th}$  layer (fraction)

10 = conversion factor from  $kg/ha$  to  $ton/ha$

The total carbon stock for the 0-30 cm depth was calculated as:

$$C_{tot}(t/ha) = \sum_{i=1}^3 C_i$$

[6]

Finally, the terrestrial (total) carbon stock (ton/ha) of a given site was obtained from:

$$C_{totalstock} = C_{soil} + C_{AGWV} + C_{HIV} + C_{BGB} \quad [7]$$

where:

$C_{soil}$  = soil carbon stock

$C_{AGWV}$  = carbon stock of above-ground woody vegetation

$C_{HIV}$  = carbon stock of herbaceous vegetation

$C_{BGB}$  = carbon stock of below ground biomass

As 1 tone of soil OC = 3.67 (44/12-ratio of molecular weight of CO<sub>2</sub> to carbon) tons of CO<sub>2</sub> (sequestered or emitted) (Pearson *et al.*, 2007; Craig *et al.*, 2010), the equivalent CO<sub>2</sub> sink (tons/ha) in a given site was estimated from:

$$\text{CO}_2\text{e} = 3.67 * \text{C}_{\text{total}} \quad [8]$$

### 3. RESULT AND DISCUSSION

The results obtained from field measurement and laboratory analysis were discussed on grazing system basis.

#### 3.1. Terrestrial Carbon Stock of East cluster

The East cluster is primarily found in the Ethiopian Somali Region and Babile woreda of Oromia Region. From the East cluster four grazing systems (Harshin, Daketo, Mulu, and Afdem) were selected. The ranges of some soil characteristics of the four grazing systems selected from the East cluster are presented in Table 1.

Table 1. Soil characteristics of East cluster

Grazing system	Soil texture	Bulk density (g cm <sup>-3</sup> )	Soil pH
Harshin	Sandy loam to sandy clay loam	1.85-1.90	8.75 - 8.92
Daketo	loamy fine sand and sandy clay	1.90-2.01	8.23-8.35
Mulu	sandy clay loam and clay loam	1.86-1.98	8.42-8.62
Afdem	loamy fine sand	1.29-1.97	7.2-8.92

##### 3.1.1. Harshin sub grazing system

The Hussein Semane sub-system (n=3) in Harshin grazing system is dominated mainly by degraded grassland and, hence, significant proportion of the carbon stock was contributed by the soil. Accordingly, the baseline mean terrestrial carbon stock of the grazing system was 73.924±26.426 t ha<sup>-1</sup> with coefficient of variation of 35.75%, which actually indicates the existence of high variability within the system. Similarly, the corresponding mean CO<sub>2</sub>e of the system can be taken as 271.301±96.984 t ha<sup>-1</sup> (Table 2). As it has always been true, combined management of both soil and vegetation would contribute for better carbon sequestration and, thus, climate change mitigation.

Table 2. Carbon stock of Harshin sub grazing system

Plot	Carbon stock (t ha <sup>-1</sup> ) in					CO <sub>2</sub> e (t ha <sup>-1</sup> )
	AGWV	HV	BGB	Soil	Total	
1	-	0.004	0.003	60.46	60.467	221.914
2	-	0.003	0.002	56.93	56.935	208.951
3	38.4	-	7.68	58.29	104.37	383.038
Mean ±StD				58.56±1.78	73.924±26.426	271.301±96.984

AGWV = above-ground woody vegetation; HV = herbaceous vegetation; BGB = below-ground biomass.

The carbon stock consistently decreased with soil depth (Figure 2). Nevertheless, the difference was the highest in grass land compared with the other two. This could be attributed to the fact that, in grasslands, most of the contribution is limited to the upper few centimeters of the soil (Foth, 1990).

The CO<sub>2</sub>e also varied in accordance with the variation in soil organic carbon stock. Nevertheless, the variability in soil carbon stock among the sampled sites was relatively low with a coefficient of variation of 3.04%.

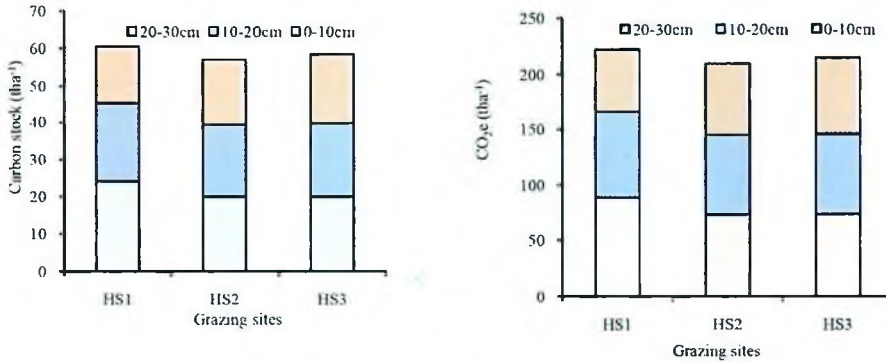


Figure 2. Carbon stock and CO<sub>2</sub>e (t ha<sup>-1</sup>) variation with soil depth at the Hussein Semane grazing sites in Harshin grazing system, Somali region (HS = Hussein Semane).

### 3.1.2. Daketo grazing system

Samples were collected from two separate plots one each at the upper and lower (valley) parts of the Elbahey sub-system. The upper part of the valley is covered with *Euphorbia abyssinica* and *Lantana camara* vegetation with poorly growing annual grass. The valley bottom, on the other hand, is a marshy area covered with perennial grasses and herbaceous vegetation of different types. At both sites, there were no trees to be sampled. The results indicate that the contribution of the herbaceous vegetation, as compared to that of the soil, was almost insignificant. Accordingly, at the upper part where cactus and *Lantana camara* were the dominant vegetation cover, 99.998% (120.49 t ha<sup>-1</sup>) of the carbon stock was stored in the soil (Table 3). This clearly indicated the importance of the soil as a carbon sink in this degraded grazing system. The upper part of the Daketo valley contained relatively better carbon stock compared with the valley bottom due to the presence of *Euphorbia abyssinica* and *Lantana camara* and the intensive grazing of the valley particularly during the dry season. On the other hand, similar to results obtained in the previous grazing system, the carbon stock decreased with soil depth (Figure 3).

Table 3. Terrestrial carbon stock of the Elbahey grazing sub-system in Daketo grazing system of Somali region

Plot	Carbon stock (t ha <sup>-1</sup> ) in				Total	CO <sub>2</sub> e (t ha <sup>-1</sup> )
	AGWV	HV	BGB	Soil		
1	-	0.002	0.001	120.49	120.493	442.209
2	-	0.002	0.001	59.91	59.913	219.881
Mean ± StD				90.20 ± 42.837	90.203 ± 42.837	331.045 ± 157.210

AGWV = above-ground woody vegetation; HV = herbaceous vegetation; BGB = below-ground biomass

The corresponding CO<sub>2</sub>e ranged from 219.881 t ha<sup>-1</sup> in the valley to 442.209 t ha<sup>-1</sup> in the upper part of the sub-grazing system. The Daketo grazing system is a very extensive system dominated mainly by



sparingly populated trees of *Acacia seyal*, *Euphorbia abyssinica*, and *Lantana camara*. The topography of the system is also characterized by hills and valleys with extensive rock outcrops covering the hills.

On the basis of this assumption, therefore, the baseline carbon stock of the system was taken as  $90.203 \pm 42.837 \text{ t ha}^{-1}$  with coefficient of variation of 47.49%, which also shows the high variability within the system. The corresponding baseline mean  $\text{CO}_2\text{e}$  of the system was  $331.045 \pm 157.210 \text{ t ha}^{-1}$ .

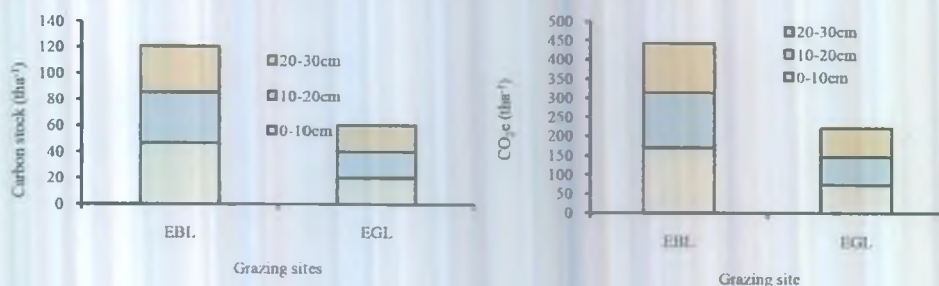


Figure 3. Carbon stock and  $\text{CO}_2\text{e}$  ( $\text{t ha}^{-1}$ ) variation with soil depth for selected grazing sites in Dakato grazing system (EBL = Elbahey bush land; EGL = Elbahey grass land).

### 3.1.3. Mulu grazing system

The Mulu grazing system comprises of Jejeba, Kulmeye and Mencha sub-grazing systems. All the sub-systems were characterized by the presence of a mixture of trees dominantly of acacia species, shrubs, cactus, grasses and other herbaceous vegetation.

At Mulu grazing system, both vegetation and soil contributed to the terrestrial carbon stock of the system. On the basis of this, 18.875, 20.895, and 23.605% of the terrestrial carbon stock at Jejeba, Mencha, and Kulmeye, respectively, was stored in the vegetation cover, while the corresponding carbon stock in the soil was 81.125, 79.105, and 76.395% (Table 4). Because of the significant contribution from the vegetation cover, the terrestrial carbon stock was relatively high. The corresponding  $\text{CO}_2\text{e}$  ranged from  $455.898 \text{ t ha}^{-1}$  at Kulmeye to  $660.791 \text{ t ha}^{-1}$  at Mencha. Jejeba and Mencha have shown similar terrestrial carbon stock.

Table 4. Carbon stock of the Mulu Grazing System

Site	Carbon stock ( $\text{t ha}^{-1}$ ) in				Total	$\text{CO}_2\text{e}$ ( $\text{t ha}^{-1}$ )
	AGWV	HV	BGB	Soil		
Jejeba	27.89	0.002	5.58	143.86	177.332	650.808
Mencha	31.35	0.002	6.27	142.43	180.052	660.791
Kulmeye	24.43	0.003	4.89	94.90	124.223	455.898
Mean $\pm$ StD				$127.063 \pm 27.863$	$160.536 \pm 31.477$	$589.166 \pm 115.521$

AGWV = above-ground woody vegetation; HV = herbaceous vegetation; BGB = below-ground biomass.

The organic carbon stock of the soils decreased consistently with soil depth (Figure 4). At system level, the mean soil carbon stock was  $127.063 \pm 27.863$  with a coefficient of variation of 21.93%, which indicates the presence of moderate variability among soils within the grazing system.

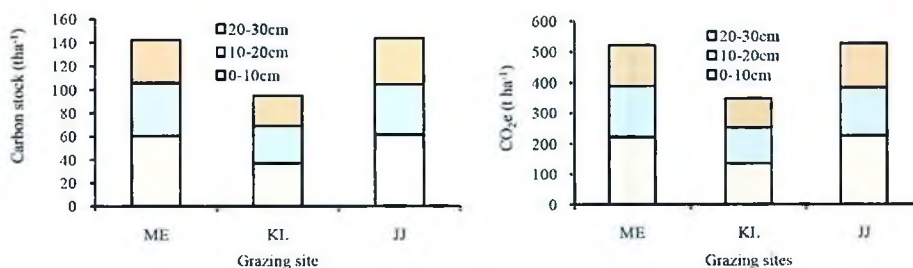


Figure 4. Carbon stock and CO<sub>2</sub>e (t ha<sup>-1</sup>) variation with soil depth at selected grazing sites in Mulu grazing system (ME = Mecha; KI = Kulmeyer; JJ = Jejeba).

The mean baseline terrestrial carbon stock of the system can be taken as 160.536±31.477 t ha<sup>-1</sup> with coefficient of variation of 19.61%, which indicated the existence of relatively low variability in the system. Similarly, the corresponding baseline mean CO<sub>2</sub>e of the system can be taken as 589.166±115.521 t ha<sup>-1</sup>.

### 3.1.4. Afdem Grazing System

Two sub grazing systems, Dire Ella and Siselu, were considered during the study. Dire Ella is more degraded compared to the adjacent Mulu grazing system in terms of its woody perennial composition. The terrestrial carbon stock in the Afdem grazing system varied from 50.210 t ha<sup>-1</sup> at grass dominated Siselu sub-system to 67.855 t ha<sup>-1</sup> at Dire Ella (Table 5). Similar to the trends observed in the other grazing systems, the proportion of the total carbon stock stored in the soils was generally higher than that in the vegetation. The equivalent carbon dioxide sequestered ranged from 184.271 t ha<sup>-1</sup> at Siselu 1 to 249.028 t ha<sup>-1</sup> at Dire Ella.

Table 5. The terrestrial carbon stock and its carbon dioxide equivalent at two grazing sub-systems in Afdem grazing system, Somali region

Site	Carbon stock (t ha <sup>-1</sup> ) in				Total	CO <sub>2</sub> e (t ha <sup>-1</sup> )
	AGWV	HV	BGB	Soil		
Dire Ella	15.46	0.005	3.09	49.30	67.855	249.028
Siselu 1	-	-	-	50.21	50.210	184.271
Siselu 2	-	0.003	0.002	65.38	65.385	239.963
Siselu 3	-	0.005	0.003	51.03	51.038	187.309
Mean±StD				53.98±7.633	58.622±9.296	215.143±34.118

AGWV = above-ground woody vegetation; HV = herbaceous vegetation; BGB = below-ground biomass

The carbon stock increased with soil depth consistently at both the grazing sub-systems (Figure 5). The results obtained so far indicated the relative importance of the upper 10 cm of the soil layer as carbon sink. At system level, the mean soil carbon stock was 53.980±7.633 which shows relatively narrow variation as was also indicated by the low coefficient of variation (14.14%).

The mean carbon stock for this system can be taken as 58.622±9.296 with relatively low variability as indicated by the coefficient of variation (15.86%). The corresponding baseline mean carbon dioxide equivalent is 215.143±34.118 t ha<sup>-1</sup>.

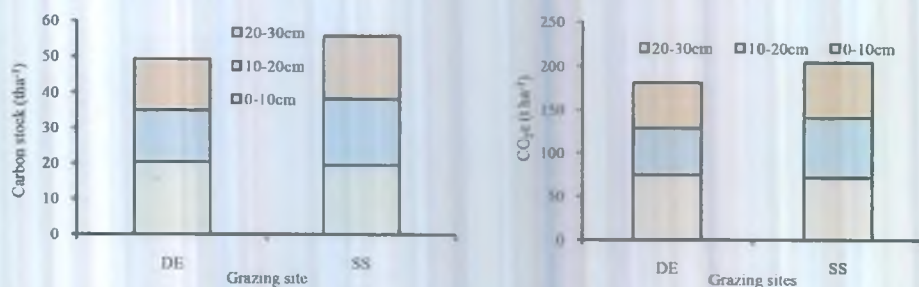


Figure 5. Variation of soil carbon stock and the corresponding CO<sub>2</sub>e with soil depth at selected grazing sub-systems in Afdem, Somali region (DE = Dire Ella; SS = Sisclu).

Comparison of the four grazing systems selected in the East cluster indicated that the status of terrestrial carbon stock and the corresponding CO<sub>2</sub>e was relatively better at Mulu grazing system followed by Daketo and Harshin systems (Figure 6). The Afdem system, being relatively the drier system, was found to be low in its terrestrial carbon stock and the corresponding carbon dioxide equivalent. Nevertheless, the variability of the terrestrial carbon stock was the highest in the Daketo grazing system followed by the Harshin grazing system. This may imply that the number of sampling sites needs to be increased in order to get representative value of carbon stock. On the other hand, the variability of the terrestrial carbon stock was relatively low at Mulu and Afdem grazing systems.

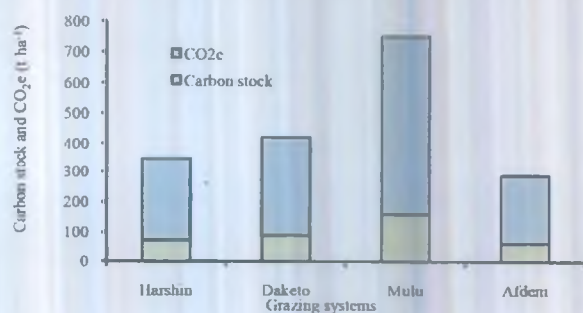


Figure 6. Mean terrestrial carbon stock and its carbon dioxide equivalent (t ha<sup>-1</sup>) at four pastoral area grazing systems in Somali region.

In addition to helping in mitigating climate change effects through carbon sequestration, the pastoral areas can also be sources of income from the carbon finance. Using the rate used by Ethiopian Wildlife Authority (Daan *et al.*, 2012), which suggests a currency value of \$4/tCO<sub>2</sub>e, the monetary value of the mean carbon dioxide sequestered in each of the grazing systems will be 1085.18, 1324.16, 2356.67, and 905.88 US\$ ha<sup>-1</sup> for Harshin, Daketo, Mulu, and Afdem grazing systems, respectively.

### 3.2. Terrestrial Carbon Stock of the Afar Cluster

The pastoralist community in Afar region makes up about 90% of the total population with remaining 10% being agro-pastoralists. This clearly indicated the importance of pastoralism in the region. In the Afar cluster, three grazing systems were selected based on discussion held with the local partners and government offices. These systems were Gewanc, Halydege, and Dubdub grazing systems. As can be seen from Table 6, soils of these grazing systems were dominantly loam to clay in texture with pH that

was in the range of strongly alkaline (Tekalign, 1991). Bulk density values of some of the soils also indicated the existence of soil compaction (Jones, 1983).

Table 6. Soil characteristics of Afar cluster

Grazing system	Soil texture	Bulk density	Soil PH
Mollale	clay loam to clay	1.14 - 1.36 g cm <sup>-3</sup>	8.83-9.79
Halaydege	loam, sandy clay loam, and sandy clay	1.28 to 1.40 gcm <sup>-3</sup>	8.71- 9.51
Dudub	loamy sand to sandy clay	1.25-1.51 g cm <sup>-3</sup>	8.02 to 8.99

3.2.1. *Gewane grazing system*

In the Gewane grazing system, there was no vegetation sample of any kind collected due to complete coverage by *Prosopisjuliflora*, which was being cleared. There was also no other herbaceous vegetation due to overgrazing and prolonged dry season of the time. The carbon stock of the sub-system was relatively low due to its degraded nature and absence of vegetation cover (Table 7). However, the area has an immense potential for rehabilitation if proper management practices can be put in place. The issue related to *Prosopisjuliflora*, however, should receive a more serious attention than ever, for it has completely replaced the native vegetation cover.

Table 7. Soil carbon stock and its carbon dioxide equivalent at Mollale grazing sub-system Gewane, Afar region

Site	Carbon stock (t ha <sup>-1</sup> ) in				Total	CO <sub>2</sub> e (t ha <sup>-1</sup> )
	AGVV	HV	BGB	Soil		
Molale	-	-	-	33.43	33.43	122.688

AGVV = above-ground woody vegetation; HV = herbaceous vegetation; BGB = below-ground biomass;

The depth-wise distribution of the organic carbon stock followed a consistent trend with soil depth (Figure 7). This indicates the relative importance of the top 10 cm of soil in carbon stock management.

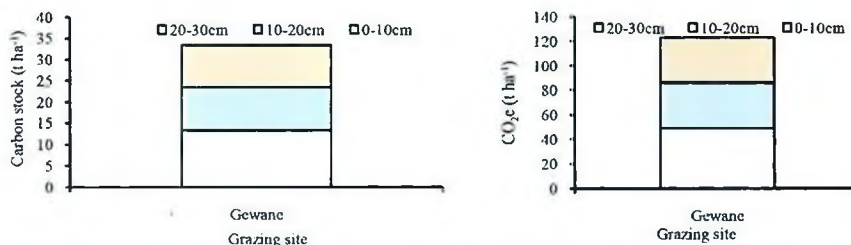


Figure 7. Soil carbon stock and its carbon dioxide equivalent distribution with soil depth at Mollale sub-grazing systems in Gewane, Afar region.

3.2.2. *Halaydege grazing system*

Three sub-grazing systems were considered from the Halydege grazing system namely Gonita Birka, Andido and Halaydege near the village. The Andido sub-system is characterized by extensive area of grazing land that did not contain any vegetation cover at the time of sampling (dry season). Gointa Birka and Halaydege sub-systems, on the other hand, were covered by mixed grass, herbaceous vegetation and non-woody bushes. In these systems also, the area covered by *Prosopisjuliflora* was

quite significant. However, there were some native tree species such as *Acacia nilotica*, *Acacia senegal* and *Acacia abyssinica* in the area.

As described above, the woody vegetation was scant in the system. As a result most of the carbon stock (99.99%) at Halydege village and Gointa Birka, and 100% at Andido, was stored in the upper 0-30 cm depth of the soils. Owing to the poor vegetation cover, the carbon stock was relatively low and ranged from 42.160 t ha<sup>-1</sup> at Halydege village to 49.095 t ha<sup>-1</sup> at Gointa Birka. The corresponding carbon dioxide equivalent varied from 154.764 t ha<sup>-1</sup> at Halydege to 180.179 t ha<sup>-1</sup> at Gointa Birka (Table 8).

Table 8. Terrestrial carbon stock and its carbon dioxide equivalent at the Halydege grazing system in Afar region

Site	Carbon stock (t ha <sup>-1</sup> ) in				Total	CO <sub>2</sub> e (t ha <sup>-1</sup> )
	AG WV	HV	BGB	Soil		
Halydege village	-	0.006	0.004	42.16	42.170	154.764
Gointa Birka	-	0.003	0.002	49.09	49.095	180.179
Andido	-	-	-	45.62	45.62	167.425
Mean ± StD				45.623 ± 3.465	45.628 ± 3.463	167.456 ± 12.708

AGWV = above-ground woody vegetation; HV = herbaceous vegetation; BGB = below-ground biomass; StD = standard deviation.

The distribution of the carbon stock with soil depth indicates that, at all the sites, the relatively better contribution was from 10-20 cm depth of the soils (Figure 8). Except at Andido, the high carbon stock in this layer was due to the high bulk density value rather than high organic carbon content. Furthermore, the variability of the soil carbon stock at system level was relatively low as indicated by the coefficient of variability (7.59%). The mean value obtained from the three sites can, therefore, represent the soil carbon stock of the entire system reasonably well.

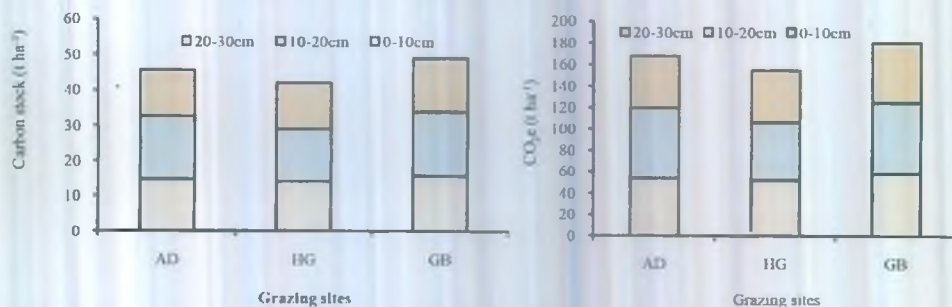


Figure 8. Soil carbon stock and its carbon dioxide equivalent variation with soil depth at selected sites in Halydege grazing system, Afar region (AD = Andido; HG = Halydege; GB = Gointa Birka).

The baseline mean value of the carbon stock and its carbon dioxide equivalent for the Halydege grazing system can be taken as 45.628±3.463 and 167.456±12.708 t ha<sup>-1</sup>, respectively, with coefficient of variation of 7.59%. This low coefficient of variation indicates that the variability in carbon stock within the system is relatively low and can be represented by the mean value reasonably well.

### 3.2.3. Dudub grazing system

The carbon stock assessment was conducted in three sub systems namely Motor Sefer, Irribeto and Hudud. Similar to the previous grazing systems, about 99.99% of the terrestrial carbon stock was in the soil system in all the three systems. The herbaceous vegetation was highly degraded and over grazed at the time of sampling, which was during the dry season. Hence, the contribution from grasses and other herbaceous species to the total carbon stock was extremely small. Except at the Motor Sefer sub-system, the carbon stock was very low as compared to what was recorded in the other systems. The values varied between 16.884 t ha<sup>-1</sup> at Irribeto to 49.836 t ha<sup>-1</sup> at Motor Sefer (Table 9). The corresponding carbon dioxide ranged from 61.942 to 182.898 t ha<sup>-1</sup>. As compared to the Gewane and Halydege systems, this is a more degraded grazing system.

Table 9. Terrestrial carbon stock and its carbon dioxide equivalent at the Dudub grazing system in Afar region

Site	Carbon stock (t ha <sup>-1</sup> ) in				Total	CO <sub>2</sub> e (t ha <sup>-1</sup> )
	AGWV	HV	BGB	Soil		
Motor Sefer	-	0.006	0.004	49.83	49.840	182.913
Irribeto	-	0.004	0.003	16.88	16.887	61.976
Hudud	-	0.006	0.004	21.82	21.830	80.116
Mean ± StD				29.51 ± 17.77	29.519 ± 17.771	108.335 ± 65.220

AGWV = above-ground woody vegetation; HV = herbaceous vegetation; BGB = below-ground biomass; StD = standard deviation

The soil carbon stock did not follow any consistent trend with soil depth at the Motor Sefer site (Figure 9). At Irribeto, soil sample collection was limited to the upper 10 cm depth only due to shallow depth of the soil. At the Dudub grazing system, there was high variability of the soil carbon stock as revealed by the high coefficient of variation (60.22%). This implies, for future studies, the number of sampling sites/grazing sub-systems has to be increased in order to get a mean value for the system

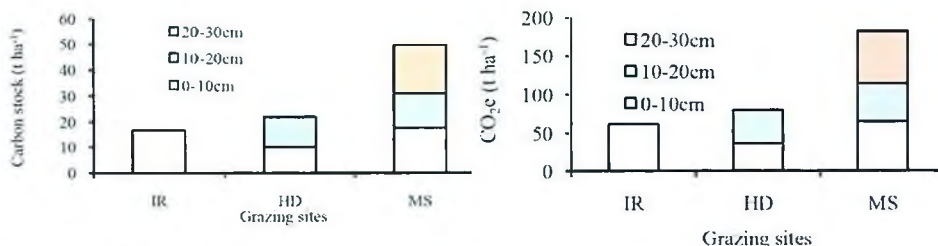


Figure 9. Soil carbon stock variation with soil depth at selected sites in Dudub grazing system in Afar region (IR = Irribeto; HD = Hudud; MS = Motor Sefer).

The baseline mean terrestrial carbon stock and its carbon dioxide equivalent for this system can be taken as 29.519±17.771 t ha<sup>-1</sup> with equivalent carbon dioxide of 108.335±65.220 t ha<sup>-1</sup> and coefficient of variation of 60.20%.

Comparison at system level indicated that the baseline mean terrestrial carbon stock was better at Halydege followed by Gewane grazing system, while it was the lowest at Dudub grazing system (Figure 10). In terms of management, therefore, the Dudub grazing system requires more attention in order to rehabilitate the severely degraded grazing system. The variability of the terrestrial carbon stock was the highest at the Dudub grazing system as compared to the Halydege system.

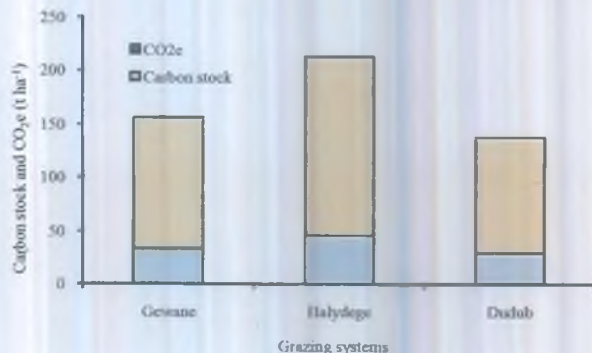


Figure 10. Mean terrestrial carbon stock and its CO<sub>2</sub>e (t ha<sup>-1</sup>) at selected grazing systems in Afar region.

If the carbon dioxide sequestered is changed into monetary value using the Ethiopian Wildlife Authority rate of US \$4/t CO<sub>2</sub>e, the amount of money that can be generated from the carbon finance scheme will be 490.75, 669.79, and 433.28 USD per ha of grazing land for Gewane, Halydege, and Dudub grazing systems, respectively.

### 3.3. Terrestrial Carbon Stock of the South Cluster

The South Cluster is one of the clusters under PRIME project which is operating in Borana and Guji Zones of Oromiya Region. From this cluster, a total of four grazing systems were considered for this study. The systems were Malbe and Dire from Borana zone, and DidaDheda and GolbaGenale from Guji zone. Some physico-chemical properties of the selected grazing systems are presented in Table 10. As can be seen from the results, soils in the study sites are loamy soils with pH that ranges from near neutral to strongly alkaline particularly in the Malbe grazing system.

Table 10. Some soil properties of the selected grazing systems in South cluster

Grazing system	Soil texture	Bulk density	Soil PH
Malbe	Sandy loam to sandy clay loam	1.15-1.42 g cm <sup>-3</sup>	8.14-9.96
Dire	Sandy loam	1.32-1.62 g cm <sup>-3</sup>	7.4-8.0
DidaDheda	Sandy loam and sandy clay loam	0.98- 1.52 g cm <sup>-3</sup>	6.83-7.78
GolbaGenale	Sand to sandy clay loam	1.25-1.68 g cm <sup>-3</sup>	7.02-7.35

#### 3.3.1. Malbe Grazing System

Similar to most other systems discussed so far, the major sink of carbon in this sub-system (Elwaye) was the soil (Table 11). About 99.99% of the carbon stock at all the sites was stored in the soil. Moreover, spatial difference in carbon stock was also observed at the Arbala Dida grazing site. On the other hand, there was very little difference in carbon stock of protected and unprotected grass land at Dida Haya. In general, the terrestrial carbon stock at the Elwaye subsystem, representing the Malbe grazing system, ranged from 43.564 to 72.446 t ha<sup>-1</sup> with a corresponding carbon dioxide equivalent of 159.880 and 265.877 t ha<sup>-1</sup>, respectively.

Table 11. Terrestrial carbon stock and its equivalent carbon dioxide at Malbe grazing system, Borana zone of Oromia region

Site	Carbon stock (t ha <sup>-1</sup> ) in				Total	CO <sub>2</sub> e (t ha <sup>-1</sup> )
	AGWV	HV	BGB	Soil		
Arbala Dida 1	-	0.004	0.0002	43.56	43.564	159.880
Arbala Dida 2	-	0.006	0.0001	55.39	55.396	203.303
Dida Haya P*	-	0.006	0.0025	72.44	72.446	265.877
Dida Haya Up	-	-	0.0001	72.44	72.44	265.855
Mean ± StD				60.958 ± 14.111	60.962 ± 14.110	223.729±51.785

AGWV = above-ground woody vegetation; HV = herbaceous vegetation; BGB = below-ground biomass; StD = standard deviation; P = protected; Up = unprotected.

The depth-wise variation of the soil carbon stock indicated that its variation was not consistent with soil depth (Figure 11). This indicated the importance of all the three layers in storing carbon in the soil system. Furthermore, there was considerable variability in soil carbon stock within the system with a coefficient of variation of 23.15%. This variability was almost the major source of the terrestrial carbon stock within the system as well.

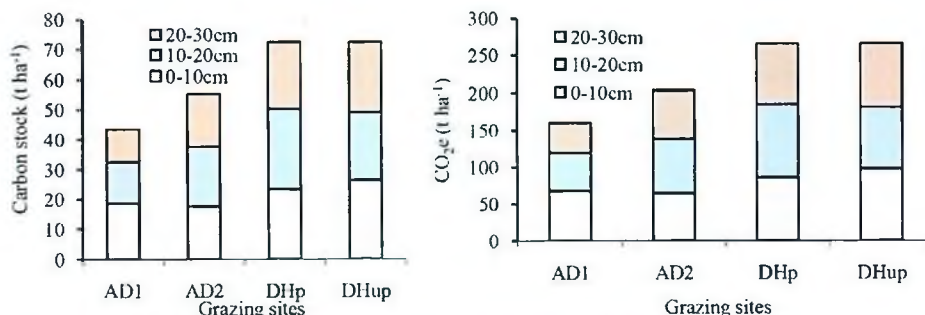


Figure 11. Soil carbon stock and equivalent carbon dioxide variation with soil depth at the Malbe grazing system in Borana zone of Oromia region (AD = Arbala Dida; DH = Dida Haya; P = protected; up = unprotected)

Huge difference in carbon stock between the two different sites within the Malbe grazing system was observed. However, as baseline information, the mean terrestrial carbon stock and the corresponding carbon dioxide equivalent for the Malbe system can be taken as 60.962±14.110 and 223.729±51.785 t ha<sup>-1</sup>, respectively, with coefficient of variation of 23.15%.

The Malbe grazing system has very good potential for fast improvement. Particularly the extensive grazing land at Dida Haya, can support large number of livestock for long period, if allowed to fully attain its potential through participatory rangeland management. The huge difference in grass cover between the enclosed and intensively grazed adjacent land at Sarite is a clear indication of the potential of the grazing land for fast rehabilitation.

### 3.3.2. Dire grazing system

Three sites were selected for the study. These were Dubuluk grazing sub-system, Rare Chebicha, and Dida Medhecho within the Soda grazing sub-system. The Dubuluk site was dominantly occupied by scattered shrubs, bushes, and grass. The Rare Chibicha was also composed of scattered woody



vegetation, dominantly of acacia species, while the Dida Medhecho was dominantly covered by degraded grass and some noxious vegetation.

Except at Rare Chebicha, the major carbon sink at the Dire grazing system was the soil (Table 12). At Rare Chebicha, the vegetation cover contributed about 5.98% of the terrestrial carbon stock, whereas at the other two sites the soil accounted for 99.99% of the terrestrial carbon stock. The Dida Medhecho site, dominantly occupied by grass, had relatively the highest terrestrial carbon stock as compared to the other two sites. In general, the terrestrial carbon stock within the Dire grazing system ranged from 61.548 to 101.905 t ha<sup>-1</sup>. The corresponding carbon dioxide equivalent, on the other hand, varied between 225.881 t ha<sup>-1</sup> at Dubuluk to 373.991 t ha<sup>-1</sup> at Dida Medhecho.

Table 12. Terrestrial carbon stock and its carbon dioxide variation with soil depth at three sites in Dire grazing system, Borana Zone

Site	Carbon stock (t ha <sup>-1</sup> ) in					CO <sub>2</sub> e (t ha <sup>-1</sup> )
	AGWV	HV	BGB	Soil	Total	
Dubuluk	-	0.005	0.003	61.54	61.548	225.881
Rare Chebicha	4.22	0.005	0.843	79.57	84.638	310.621
Dida Medhecho	-	0.003	0.002	101.90	101.905	373.991
Mean±StD				81.003±20.218	81.697±20.248	303.498±74.312

AGWV = above-ground woody vegetation; HV = herbaceous vegetation; BGB = below-ground biomass; StD = standard deviation.

Furthermore, the carbon stock and the corresponding carbon dioxide equivalent in the major carbon sink, the soil, showed spatial variation with soil depth at a given site (Figure 12). Accordingly, the soil carbon stock decreased consistently with soil depth at Dubuluk site, while it showed irregular pattern with depth at Rare Chebicha and Dida Medhecho. At system level, the mean value can be taken as 81.003±20.218 with coefficient of variation of 24.96%. This indicates the existence of some notable variability in carbon stock of soils in the grazing system.

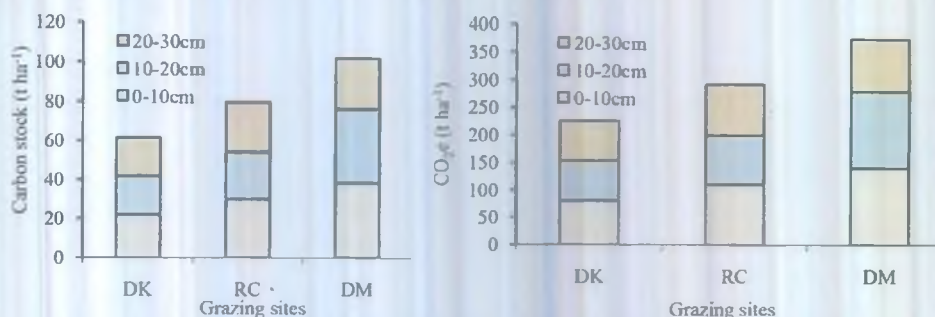


Figure 12. Soil carbon stock and its carbon dioxide equivalent distribution with dept at selected site in Dire grazing system of Borana Zone, Oromia region (DK = Dubuluk; RC = Rare Chebicha; DM = Dida Medhecho)

The study showed that the Dire grazing system is better in its terrestrial carbon stock than the Malbe grazing system (Figure 13). However, the variability was slightly higher at Dire than it was at the Malbe grazing system.

If the carbon dioxide sequestered is converted into carbon finance using the Ethiopian Wildlife Authority rate of \$4/tCO<sub>2</sub>e, the amount of money generated will be US\$ 894.916 and 1213.952 per ha of grazing land, respectively, for Malbe and Dire grazing systems.

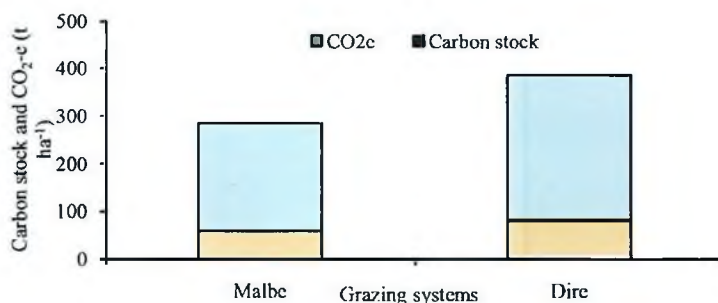


Figure 13. Mean terrestrial carbon stock and its carbon dioxide equivalent for Malbe and Dire grazing systems in Borana Zone of Oromia region

3.3.4. Dida Dheda grazing system

At the Dida Dheda grazing system, both vegetation cover and the soil contributed considerably to the terrestrial carbon stock (Table 13). Consequently, the vegetation accounted for 34.16% (23.705 t ha<sup>-1</sup>) and 23.27% (21.174 t ha<sup>-1</sup>) at protected areas of Mieceso and Siminto, respectively. On the other hand, nearly 99.99% (49.28 and 61.09 t ha<sup>-1</sup>) of the terrestrial carbon stock at unprotected areas of Miecesa and Siminto, respectively, was stored in the soil system. This clearly shows the importance of protecting the grazing sites for improving their carbon sequestration potential and also productivity. The difference in carbon stock between protected and unprotected lands is largely due to difference in vegetation cover particularly the scattered trees found in the system.

Table 13. Terrestrial carbon stock and its carbon dioxide equivalent at some grazing site in DidaDheda grazing system, Guji zone of Oromia region

Site	Carbon stock (t ha <sup>-1</sup> ) in					CO <sub>2</sub> e (t ha <sup>-1</sup> )
	AGWV	HV	BGB	Soil	Total	
Meesa P	19.75	0.005	3.95	45.68	69.385	254.643
Mecas Up**	-	0.006	-	49.28	49.286	180.880
Siminto P	17.64	0.004	3.53	69.81	90.984	333.911
Siminto Up	-	0.003	-	61.09	61.093	224.211
Mean±StD				56.465±11.067	67.687±17.585	248.411±64.537

AGWV = above-ground woody vegetation; HV = herbaceous vegetation; BGB = below-ground biomass; StD = standard deviation; P\* = protected; Up\*\* = unprotected

The corresponding carbon dioxide equivalent across the system varied from a minimum of 180.880 t ha<sup>-1</sup> at the unprotected grazing land of Miecesa to a maximum of 333.911 t ha<sup>-1</sup> at the protected grazing land of Siminto. Furthermore, it is important to note that, at both grazing sub-systems, the minimum carbon stock and its carbon dioxide equivalent was recorded at the adjacent unprotected grazing lands. However, this was not reflected in the soil carbon stock at Miecesa. This might give an indication that the building up of the soil carbon stock through such management practices might require relatively longer period than usually anticipated.

Spatial variation in soil carbon stock with soil depth was observed (Figure 14). However, the variation was consistent with depth in the unprotected grazing lands only. The variation among the sampled sites within the system, as indicated by the coefficient of variation (19.60%), was relatively

acceptable. The mean soil carbon stock for the system can be taken as  $56.465 \pm 11.067 \text{ t ha}^{-1}$  with a corresponding carbon dioxide equivalent of  $207.227 \pm 40.616 \text{ t ha}^{-1}$ .

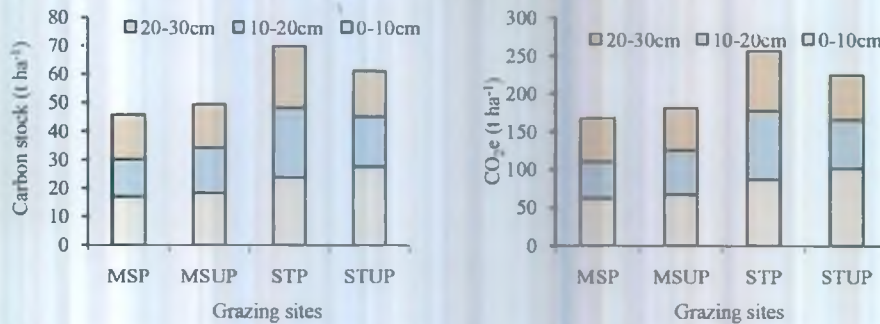


Figure 14. Soil carbon stock and the corresponding carbon dioxide equivalent variation with soil depth at selected sites in Dida Dheda grazing system, Guji zone of Oromia region (MSP = Mecsca protected; MSUP = Mecsca unprotected; STP = Siminto protected; STUP = Siminto unprotected)

The mean values of carbon stock and equivalent carbon dioxide of the two systems were  $67.687 \pm 17.585$  and  $248.411 \pm 64.537 \text{ t ha}^{-1}$ , respectively. The monetary value of the carbon dioxide sequestered, based on the Ethiopian Wildlife Authority rate of  $\$4/\text{tCO}_2\text{e}$ , amounts to US\$ 993.644 per ha of grazing land.

### 3.3.5. Golba Genale grazing system

Because the system is dominantly covered by forests of different species, the contribution of this forest cover to the terrestrial carbon stock of the system was significant. Therefore, the forest's carbon stock accounted for 33.8% ( $43.940 \text{ t ha}^{-1}$ ) and 28.72% ( $41.952 \text{ t ha}^{-1}$ ) at Guduba Burure and Mucho sub-systems, respectively (Table 14). On the other hand, the soil system, even under forested environment, proved to be the major carbon sink in this grazing system. The results further indicated that combined management of vegetation cover and soil could result in high carbon sequestration and, thus, play a key role in climate change mitigation. This can be seen from the high carbon dioxide equivalent sequestered ( $477.10$  to  $536.011 \text{ t ha}^{-1}$ ) in this grazing system.

Table 14. Terrestrial carbon stock and its carbon dioxide equivalent at GolbaGenale grazing system in Guji zone of Oromia region

Site	Carbon stock (t ha <sup>-1</sup> ) in					CO <sub>2</sub> e (t ha <sup>-1</sup> )
	AGWV	HV	BGB	Soil	Total	
GudubaBurure	36.62	-	7.32	86.06	130.00	477.10
Mucho	34.96	0.002	6.99	104.10	146.052	536.011
Mean±StD				$95.080 \pm 12.756$	$138.026 \pm 11.350$	$506.556 \pm 41.656$

AGWV = aboveground woody vegetation; HV = herbaceous vegetation; BGB = belowground biomass; StD = standard deviation.

The depth-wise distribution of the soil carbon stock indicated that the upper 0-10 cm soil layer contributed the greatest share of the total soil carbon stock at both grazing sub-systems (Figure 15). This could be attributed to the relatively high contribution from the forest litter. Furthermore, the variability of the soil carbon stock within the system was relatively low with mean value of  $95.080 \pm 12.756 \text{ t ha}^{-1}$  and coefficient of variation of 13.42%.

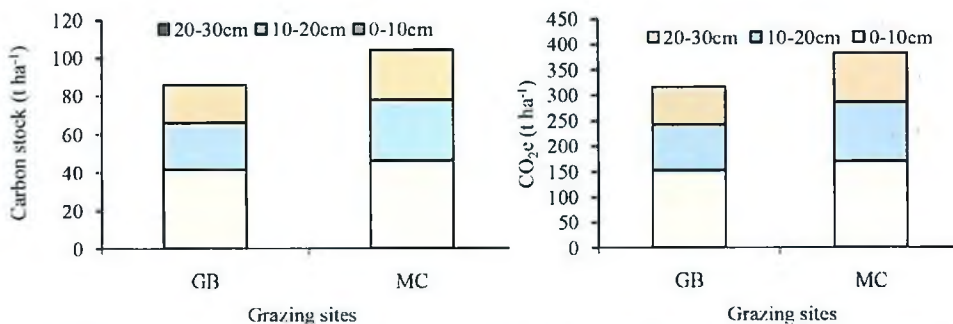


Figure 15. Soil carbon stock and its carbon dioxide equivalent distribution with soil depth at Golba Genale grazing system, Guji Zone of Oromia region (GB = Guduba Burure; MC = Mucho)

The mean carbon stock and its carbon dioxide equivalent of the Golba Genale grazing system were taken as the means of the two sub-systems, which were 138.026±11.350 and 506.556±41.656 t ha<sup>-1</sup>, respectively.

The monetary value of the carbon dioxide sequestered, using the Ethiopian Wildlife Authority rate of \$4/t CO<sub>2</sub>e, will be US\$ 1908.4 and 2144.044 per hectare of land, respectively, at Guduba Burure and Mucho. Comparison of the two systems indicated that the terrestrial carbon stock of the Golba Genale system, which is covered by forest, was higher than that of the Dida Dheda system, which is dominated by annual grasses and scattered acacia trees and noxious shrubs (Figure 16). Furthermore, the variability of the terrestrial carbon stock was relatively high at the Dida Dheda system than it was at the Golba Genale system.

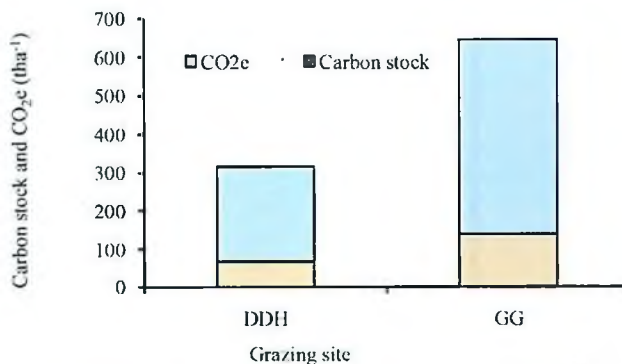


Figure 16. Mean terrestrial carbon stock and its carbon dioxide equivalent at two grazing systems in Guji Zone, Oromia region (DDH = Dida Dheda; GG = Golba Genale)

#### 4. CONCLUSION AND RECOMMENDATION

The study clearly showed carbon stock differences within clusters, and between protected and unprotected rangeland systems in the South cluster. This variation is attributed to the observable differences in management, vegetation cover, vegetation type, and soils in the study areas. Those systems with woody perennial composition had better carbon stock than the other systems which did not have woody perennials. In all the grazing systems studied, the soil system was found to be the major carbon sink.

The baseline carbon stock status indicated that pastoralists, through long existing customary system, developed deep understanding of their grazing systems and maintained them for generations. Under the changing climate and extensive exploitation of rangeland resources, it is vital to inject modern knowledge into customary system to sustain the grazing systems and enhance their environmental and economic contribution to the pastoral community in particular and the nation at large.

The results indicated that even the highly degraded grazing lands in pastoral areas have significant carbon stock in them. Rehabilitation of such grazing systems through, for instance, participatory rangeland management approach could enhance their carbon sequestration potential further. This include, but not limited to strengthening communal *Kallo*, revitalizing and strengthening the customary system, adjusting animal population to the carrying capacity of the grazing systems, etc. This will help create climate change resilient ecosystems that support the livestock better and improve the livelihood of the pastoral and agro-pastoral community in the area.

The trade-offs between the government formal administrative system and PRIME rangeland grazing system (following customary system) should be resolved and all parties should agree on the coverage of rangeland systems so as to make the right decision on the carbon stock and corresponding benefits from carbon trading facilities.

The study was conducted during the wet (East cluster) and dry (all other clusters) seasons. Therefore, results only reflect one season carbon stock of the respective study areas. Similar studies should be conducted during different seasons to get the full picture of the annual carbon stock dynamics of the rangeland systems.

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## 6. ACKNOWLEDGMENTS

The authors would like to express their sincere gratitude to all those who contributed, directly or indirectly, to the successful start and completion of this project. The technical, financial support and facilitation of all the field work by the PRIME project is highly acknowledged. The support provided, in every aspect, by the Haramaya University PRIME project management during the field work deserves special gratitude.

## ENERGY EFFICIENT STOVES FOR PASTORAL COMMUNITY: EVIDENCE FROM MARKET AND PRODUCTION SYSTEMS IN AFAR, OROMIA AND ETHIOPIAN SOMALI PASTORALISTS

Kassahun Mamo and Mohammednur Ahmed\*

### EXECUTIVE SUMMARY

*It is a well-established fact that energy poverty is a significant barrier to broader development efforts for the majority of developing countries. Ethiopia is not an exception as far as this issue is concerned. Studies show that 99% of rural and 94% of urban households in Ethiopia still rely on biomass energy. This is true also for pastoral communities in Ethiopia. Using biomass energy has environmental, physical and health hazards to users. This calls the necessity for fuel efficient and healthy stoves utilization. With this in mind, an assessment was made to explore the availability and utility of fuel efficient stoves (FESs) among the pastoralists to plan appropriate intervention in the three clusters. The assessment was conducted with the objective of identifying FESs actors, identification of potential retailers and producers in the clusters as well as assessing the barriers and bottlenecks for sustainable growth of the FES market. To achieve these objectives, a qualitative data collection approach was followed through the application of focus group discussion and interviews with different stakeholders in 12 weredas of the study areas. In due course of the assessment, 12 FGDs were carried out that involve more than 95 pastoralists and agro-pastoralist communities. Besides, interviews were conducted to collect the necessary data with 19 experts working at energy and energy related offices, four NGO employees, eight individual and cooperative producers and six local wholesalers/retailers.*

*The demand side analysis in the three intervention areas indicated that the most important source of energy for pastoral and agro-pastoral communities was fire wood; to some extent charcoals. However, due to the price hike and environmental protection, the communities were facing great challenges in collecting firewood. Besides, the use of the traditional three stones/open fire stoves contributed to wastage of energy. This created a very huge demand for FESs. However, the use of FESs in Afar and Eastern clusters (Ethiopian Somali) was found to be none existent while a good experience was observed in southern clusters (Borena and Guji Zones). On the other hand, the supply of FESs in the three clusters was very limited. Except in the Southern cluster, the other two intervention areas production and distribution of FESs were non-existent, although some attempts were made by the Afar and Ethiopian Somali regional states governments to distribute FESs for free. The other problem, as far as FESs supply is concerned, was that the support for the sector by different stakeholders was not sustainable.*

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*The FESs market in the study area was full of challenges. The major challenges or barriers to the development of FESs markets found in this study were; lack of transportation, less coordinated effort of different stakeholder, working capital problems of producers and sellers, low level of awareness, product incompatibility with the cooking habits of the communities, product affordability due to low economic capability, weak market linkage. Despite these challenges, the sector also has opportunities that can create robust production and marketing system of FESs. Some of them are: pastoralist readiness to use the product, favourable government policy towards FESs, presence of traditional producers, and availability of raw materials in the locality.*

*Hence, to enhance the production and marketing system of FESs, it is necessary to carryout awareness creation and capacity building interventions, improve the number and quality of workforce working in the energy sector, coordinated efforts and intervention by various stakeholders, market linkage, producers and other stakeholder should take into account the cooking practice of the pastoral communities.*

## 1. INTRODUCTION

It is a well-established fact that energy poverty is a significant barrier to broader development efforts for the majority of developing countries. Ethiopia is not an exception as far as this issue is concerned. Studies show that 99% of rural and 94% of urban households in Ethiopia still rely on biomass energy (Environmental Protection Agency, 2004). The environmental impact of this excessive exploitation is visibly recognized with the rapid growth of deforestation. The use of wood as the primary fuel source has also resulted in significant environmental degradation, leaving less than three percent of Ethiopia's land covered by forest (WV-Australia, 2011). In addition to the pressure on the environment, open fire bring health related problems. A World Health Organization's (2006) study shows a significant association between in-door pollution and different diseases such as lower respiratory tract infection, low birth rate, nutritional deficiency, cataract and many others.

In order to reduce the pressure on natural resource and reduce in-door pollution; reducing the demand for firewood through improved cook-stoves is one of the strategies that the government of Ethiopia has adopted in its growth and transformation plan. It has various advantages. According to Elisabeth *et al.*, (2014) household level analysis revealed that users reported less smoke, minimized risk of burning, better taste of the food and reduced expenditures for fuel wood.

In addition to its benefits from the users' point of view, FESs has brought significant impact on lives of actors on the supply side. Energy for Sustainable Development (2000) reported that in Ethiopia comparison was made with income before and after people entered into the stove business. Average monthly incomes of producers of the *Lakech*, *Mirte* and mixed categories grew by factors of 3.1, 2.5 and 2.1 relative to previous activities, respectively.

Therefore, the need for energy efficient and affordable cook stoves in pastoral areas is relevant to reduce the burden from the already depleted natural resource and to commensurate the available resources with the increasing human population. It is also important to look for alternatives or quality of cook stove appliances to reduce the work burden on women and girls, who are responsible for firewood collection and food preparation, and to improve their livelihood. This requires developing robust market systems that

enable the production and distribution of appropriate clean energy products targeted at households, communities, and enterprises on a sustainable basis.

Therefore, this study aimed to investigate the production and marketing system of FESs and provide clear insight of available products and producers from both production and market system analysis of FESs in pastoral areas. This general objective has embraced the following specific objectives in it:-

- ◆ Identify actors in the energy efficient cook stove and alternative fuel market in Afar, Ethiopian Somali (Eastern Cluster - EC) and Southern Oromia (SC) and develop market system map for the sector;
- ◆ Identify retailers or potential producers (individual business or energy groups) for each cluster;
- ◆ Identify preference and capacity to purchase of the households;
- ◆ Identify major barriers that prevent the growth of robust and sustainable markets for FESs and the opportunities that exist for private actors.

The implementation partners like NGO, regional or local level energy sector offices, market actors of the sector will be benefited from output of this assessment.

## 2. METHODOLOGY

The assessment intended to meet the objectives of identifying actors in the energy efficient cook stove including producers and sellers, assessing preference and capacity to purchase the households and identify major bottlenecks that are preventing the growth of robust and sustainable markets for FESs.

To meet the aforementioned objectives, the assessment was made in the three clusters of PRIME intervention areas. Data were generated using Focus Group Discussion in all clusters and key informant interviews with expert in stakeholders' bureaus/offices and the pastoralists. The assessment was taken place from February to April, 2015 and it covered four weredas from Eastern Cluster (Jiggiga, Aweberi, Dagahabour and Shinille), three weredas from Afar Cluster (Awash, Gewane and Amibara) and five Weredas from Southern Cluster (Yabello, Dire, Moyalle, Teltelle and Negelle Borena). During the assessment the following key actors were contacted.

- ◆ experts from nineteen zone and wereda level energy and energy related offices were interviewed,
- ◆ four NGOs working on energy issues have been contacted,
- ◆ twelve Focus Group Discussions were made on which 95 pastoral and agro-pastoral community members were involved,
- ◆ eight local individual and cooperative producers were also interviewed,
- ◆ Interview with 6 wholesalers/retailers was also part of the data collection techniques.

## 3. RESULTS AND DISCUSSIONS

### 3.1. Southern Cluster Fuel Efficient Stoves Market Assessment

#### 3.1.1. Introduction

For this assessment, zone and wereda level experts, local producers, NGOs, retailers, producer cooperatives from both Guji and Borena Zones were contacted and the demand as well as supply side constraints that hinder the development of the sector were identified. In this cluster, like any other pastoral area, the dwellers were characterized by limited financial capacity to purchase fuel efficient stoves and the area had a very limited production and supply (i.e. wholesalers and retailers) capacity as per the expert information.

### 3.1.2. Demand side analysis

Firewood is the main source of energy in the area and charcoal is also an alternative source. Both are characterized by high and ever increasing price and difficult to afford for the pastoral community. In Haro Bekie *kebele* it had an average price of 40 Birr per load for fire wood. In Medo *kebele*, charcoal costs 10 Birr in medium plastic bag container, Moyalle Shoaber 50 k.g. container size charcoal costs 130 Birr. One of the FGD participants in Bobicha rural *kebele* mentioned metaphorically that the "price of charcoal and firewood is closer to livestock price" just to indicate how price of these items made their life difficult. This clearly reveals that how difficult it was for the pastoralists, who had very limited financial capacity, to purchase these sources of fuel in a larger amount.

In addition to its price hike, it was also very difficult to fetch for some villages due to prohibition directed from the government. From one of the FGDs held at Medo Kebele the participants suggest that "we have to travel up to 50 KM away from our home that requires up to two days journey". These costly sources of energy were majorly used as an input for the traditional way of cooking, three stones cook stove (open fire) and locally produced traditional cook stoves, which requires a lot of fuel and has a lot of associated problems. The open fire cooking system had various pitfalls as it was understood from views of many participants of FGDs. To mention some:

- ◆ The open fire system is not suitable for cooking and tiresome to do so;
- ◆ Negative consequences for the health of women particularly on their eyes.
- ◆ Children and women are prone to accident. It is a very common problem all over the country. According to Amogne (2014a), in many rural setting, women cook with their children strapped on their backs or the children are always around in the kitchen.
- ◆ The cooking system is also not fuel efficient

Due to the aforementioned problems, the demand for the FESs is not a luxury in this area. All participants of FGDs are willing to use FESs but they have very limited purchasing capacity. Their way out for this problem is looking for lesser price and lesser efficient cook stoves. Additional reason for a high demand for FESs in the area is its efficiency in minimizing cost of energy. As per the estimation made by the FESs users, it is up to 150 percent efficient than the traditional three stones stove (open fire). One of the participants in focus group discussion at Mega Town clearly presented her experience in the following manner.

*"40 Birr worth firewood used to produce only 100 loaf of injera using the three stone traditional stove, but the same amount of firewood can produce 250 loaf of injera and used for 'wot' cooking from its remain by using Mirt Midija (local name of one of locally produced FES)"*

In addition to the observation made by this assessment, the mini demand assessment made by GTZ revealed that the demand for FESs together with other close substitute is very high. It emanates from the ever increasing price of fuel and limited accessibility for supply of fuel in the area now a days.

In small towns of the study area also the demand for FESs is very high due to the aforementioned high cost of fuel and unavailability and ever interrupted and costly, if they have access, grid electrification. From the focus group discussion held at Mega town one participant mentioned that recently he has paid 700 Birr per month for 4 bulbs only. The combined effect of these revealed that the demand for FESs is very high in the area.

Despite the fact that there is lot of demand for the fuel efficient stoves in the area there were a lot of bottlenecks for the demand.

- ◆ The FES available in the market lacked context specific features like having size flexibility to customize the local need for preparing smaller size stable food, locally called '*chapati*'. FESs of the area has been made in a way to help the highlanders who have entirely different way of life with pastoralists.
- ◆ Unlike the traditional stoves, except rocket stove or locally called '*tikikil*', others are not prepared in a way to use all types of fuel that the pastoralist can access. However the traditional one and rocket stoves employ both charcoal and firewood. It is preferable by the pastoralist, since they don't know the time they get firewood and/or charcoal. However, most of the FESs available in the area are designed to use charcoal which is not commonly preferred by the community.
- ◆ The two mainly used types of casseroles of the area are 10.5 inch and 14 inch but it is difficult to get stoves which are customized for such kind of pastoralists' needs.

### 3.1.3. Supply side analysis

There are two routes of supplying FESs for the pastoralist viz. local production and retails of cook stoves that are produced in other areas. As per the information obtained from Borena and Guji Zone Water, Mine and Energy Offices, the area was characterized by very limited supply for fuel efficient stoves, though it was not similar across the board. In the one hand, the recent energy program didn't cover weredas like Dhas, Dilo, Teltele and on the other hand weredas like Bullehora, Liben, Yabello and Dugdedawa had relatively a better performance as far as energy efficient cook stove distribution was concerned.

Most of the producers contacted in the assessment start their business with the help of a collaborative effort of weredas energy offices and NGOs. In addition to provide financial and technical support to the producers, NGOs were also involved in direct provision of FESs. For instance, World vision provided 90 FESs for 90 households as a pilot in Borena zone. Gayo recently started implementing a three years environmental project which incorporated FESs distribution package in it. The organization had 11 years of experience in the area of energy and currently it has a three year project on integrated watershed management. The project is focused on natural resource management, disaster reduction, livelihood diversification and water sanitation, and hygiene. The project embraced different cooperatives which involved in the production of environmental friendly energy products by providing training and seed money. In this regard one cooperative located at Yabello wereda *Dedib kebele* registered a better performance. Moreover, the project also made attempts to create a market linkage with the adjacent *kebeles* to improve the use of environmental friendly energy products in the area. It also collaborated with GIZ and the wereda administration to host an exhibition on which more than 500 units of FESs were sold for the local dwellers of Yabello. Most of them were the households from Eloya, Bekie, Didara, and Derito *kebeles*.

#### A. Local Producers

In addition to this effort, private producers involved in the production of energy efficient stove which is used for baking *injera* (traditional flat bread) and *wot* cooking. The predominant type of locally produced FESs locally called *Miret Midija*.



Figure 1. Locally produced Mirt Mideja under use, Yabello

Due to local specific factors, degree of competition and method of production, the cost of production and selling price of the product is different from place to place. As it can be learned from the table hereunder, although producing and selling of fuel was financially feasible, the producers were not producing and supplying the product as much quantity as possible to meet market demand due to various challenges.

Table 1. Local Producers Financial Analysis

Ser. No.	Average Selling price (Birr)	Unit Cost (Birr)		Economic labor cost and Profit per Unit (Birr)	Location	Producers name
		Sand	Cement			
1.	135	7	42.5	85.5	Yabello	Aden Mohammed
2.	150	20	43.75	86.25	Moyalle	Bukie Godana
3.	200	10	34	156	Mega/Dire	Kara Debesicha
4.	150	3	33	114	Negelle	Worku Mamo

Source: Own calculation, 2015.

As it can be clearly understood from Table 1 above, the production of this energy efficient stove was financially feasible. The cost of each stove ranges from 85 to 156 ETB after the production cost is reduced from the selling price. Though the production of the stove was financially feasible, producers were facing different challenges to expand their production and/or to attract potential new producers. Some of the challenges and constraints were the following:

- ◆ Shortage of working capital due to limited producers' access to and interaction with MFIs and other financial institutions;
- ◆ During the dry season the supply of sand becomes very limited;
- ◆ Lack of customised mold that enables produce different sizes;
- ◆ Problem related to sufficient and suitable production site; and

- ◆ Limited market information.

Due to these pressing challenges at the area, only one cooperative was engaged in the production of rocket FESSs, locally called *Tikikel*. The case study in the following box showed the production and channel of distribution.

Box 1. Case study of Fekegna Dura Cooperatives

**Fekegna Dura** producers' cooperative was established in 2004 E.C. with a collaborative support of Cooperazione Internazionale (COOPI) Ethiopia and one local NGO. The cooperative has 12 active members who have strong vision to reach every household in Liben wereda, where the cooperative was operating. From their experience, they came to know that their product saves up to 75% of fuel and they have a capacity to produce 10 units per day. The metal sheet used in the production of rocket stove was designed and made by them and they purchased the clay from others via COOPI i.e. their production system had a backward linkage with local clay makers.

The selling price of the product is 150 Birr while the cost of production is 230 Birr. The difference is subsidized by COOPI. Despite the fact that their product was demanded very high by the local community, they received a complaint in its size and they have a plan to make the stove convenient to bake local stable food, locally called *chapatti*. The payment of their customers was collected via COOPI and deposited to their bank account at Oromia International Bank. They also provided warranty and maintenance services via telephone number registered during the distribution. As far as production and distribution was concerned, the cooperative had a good track record. Members of the cooperative had challenges of making their production site more suitable for the production system. They also had lack of office equipment for documentation.

To solve their challenge, the members forwarded the following recommendations for the better performance of their cooperative:

- ◆ They need training to produce the clay



since the resource is available in the vicinity to use the small size mold which will solve their problem related to size request of their customer and

- ◆ Government should strengthen its support in terms of provision of better production sites and offices.



Figure 2. Some of the products of the cooperatives.

### B. Retailers

The retailer contacted in the two zones, Guji and Borena, during the assessment were mostly selling FESs which were imported from the Ethio-Kenya through border town, called Moyalle- Gambo, and from Addis Ababa.

One retailer contacted at Yabello town with a business name Selam Kebede Retailer, retails stone plate locally called '*Kilinto*'. The size of the stone-plates ranges from 33 to 38 cm. The selling prices of those plates range from 50 Birr to 150 Birr for smaller and larger ones, respectively. In addition to this, she also sells a cook stove locally called '*Keraya*' which come from Kenya border town at a selling price ranging from 140 to 150 Birr. Its price at the place of origin was 100 Birr for bulk purchase. The demand for this product in the study area was better than that of the products that come from Shashemene and Addis Ababa. The main reason for this was that the former had better functional life and lower price as compared to the later. For example *Selam lakech*, which was brought from Addis Ababa, was sold at 200 Birr in this retail and its price of origin was 170 Birr, even though the lifespan of the latter product is lower than the former.



Figure 3. Stone plates, Selam FESs and Karaya stove at Selam Kebede retail shop

The other retailer, named W/o Genet Mebratu, whom we contacted during the assessment in Negelle town, shared the same experience like the above retailer. The retailer has seven years of business experience in selling locally produced and imported FES from Addis Ababa and Moyalle at different prices (see table 3.2 to the details). Besides, she indicated that the price can be reduced if the stoves are sufficiently produced in the locality.

Table 2. Types of FESs Products Retail in Negelle Main Market

Ser No.	Types of Stove	Price range in Birr	Remark
1.	Locally produced	75-130	Only tin
2.	Moyalle ( <i>Jiko</i> ) small	130	Improved and made from tin and clay
3.	Moyalle ( <i>Jiko</i> ) medium	150	Improved and made from tin and clay
4.	Moyalle ( <i>Jiko</i> ) large	170-180	Improved and made from tin and clay
5.	Tizazu (AA) small	130-150	Improved and made from tin and clay
6.	Tizazu (AA) medium	150-170	Improved and made from tin and clay

Source: Own calculation, 2015.

The most improved stove was named '*Wancha*', which is an improved one made from tin and clay but small in size. The reason for its high demand was due to its price, i.e., 80 Birr, which was relatively affordable as compared to others.

These retailers faced a lot of challenges that hinder their performance and the accessibilities of FESs to the pastoralists in effect. The most stressful challenges they mentioned during the assessment were:

- ◆ Lack of transportation;
- ◆ Loose collaboration with stakeholder, they have no information about the rocket stove produced in their wereda by Fekena Dura cooperatives; and
- ◆ Financial problem for working capital, she had only one informal financing- locally called '*Equub*'.

### 3.2. Eastern Cluster Assessment

#### 3.2.1. Demand side analysis

Like the analysis in the previous section, the most important source of energy in this area was firewood and charcoals. Depending on the economic status of the people, either they buy or collect directly from their locality. This was a common phenomenon in *Awubare* and *Degahabur weredas*. However, the cost of firewood and charcoal were ever rising here too. The price of one camel carriage in *Awubare* was around 200 Birr, which used to cost only 40-50 Birr a few years earlier. The price of the same amount of firewood in *Degahabour* and *Shinelle*, which may serve for one week energy consumption, cost around 300 Birr. Moreover, the price of 50Kg charcoal ranged from 200 to 250 Birr in this study area. Those who collected the firewoods also indicated that it was becoming difficult to find it within a short distance radius, sometimes it demands the people to travel half-a-day journey from their place of residence. Gender wise, women and female children were mainly involved in the collection of firewood and that exposed them to wild animal risks and in some instances it resulted in the miscarriage of pregnant women.

These costly fuels, in terms of accounting for those purchased and economic for those fetched from forest costs, used in inefficient way using an open fire was a common phenomenon like southern cluster.





Figure. 4. Baking utensil and stove in Awbare rural area, Ethiopian Somali

Most of the people in rural areas of *Awbare* and *Degahabur* were using the traditional three stone stoves, where those residents in the peri-urban *Shinile Wereda* used iron made charcoal stoves. The traditional three stone stove, although commonly used by the pastoralists in the rural areas, is not free of disadvantages. The user indicated that the traditional stove affected them environmentally and physically in addition to the wastage of energy. Additionally, the users were exposed to burning sensations and eye related diseases due to the smoke. Sometimes, due to inconvenient nature of the three stone stoves, fire usually causes destruction of houses. Besides, the traditional stove has the following limitations.

- ◆ It contributes to deforestation due wastage of energy;
- ◆ It reduces beautification and hygiene of residential areas.
- ◆ It results in the change of food taste; and
- ◆ It causes respiratory infections, head ache and eye related health problems as a result of smoke.

In addition to the traditional three stone stoves, some of the participants in this cluster mentioned that stoves made of iron sheet were also of common use. This was because the price was cheap and easily available in the local market since it is locally produced.

The price of both charcoal and firewood here also increase from time to time. In addition, the restriction imposed by the government to mitigate deforestation in the cluster created a greater challenge for the pastoralists to access energy input. This was worsening the situation of the people since there were limited alternative sources of energy available in the community. This calls among residents to search for alternative source of energy and/or use the existing ones in an efficient way. As a result, the community was interested to adopt fuel efficient stove to use the existing sources more efficiently.

The other dimension covered in the study was the assessment using perception toward fuel efficient stoves in the pastoralist areas. From the focus group discussions, the practice of using fuel efficient stoves was minimal. Almost in all areas, the participants were not familiar with FESs with some exception observed in *Shinelle Wereda*. There was a tendency in the *Shinelle Wereda* due to a spillover effect from

Dire Dawa city to use *Lakech* charcoal saving stoves in limited number. The women participants of the discussion were positive toward *Lakech* stove considering its energy saving nature and contribution in promoting healthy cooking practices. The main reason forwarded by the participants for lesser users of FESs was that of price and low level of awareness about the benefits associated with FESs.

Though it was difficult to measure the willingness to pay of pastoralists through FGD, effort was made to measure their willingness qualitatively. The participants of the discussion were interested in getting access to modern and energy saving cooking stoves. As a result, the pastoralist communities in the Eastern cluster showed a high tendency to use FESs. This was also learned from the discussion with the Jigjiga District Live Stock, Crop and Rural Development Office. According to the officials working in the office, the office has distributed *Mirt Midija* at *Kebribeyah* and *Fafem* kebelles where the feedback from the pastoralists is very satisfactory. However, the stoves were not compatible with the cooking and meal preparation practice of the pastoral community.



Figure 5. Commonly used charcoal stove, Shinelle Town

### 3.2.2. Supply side analysis

Mainly, the community was using more of traditional three stone stoves in the locality, like other clusters. In the peri-urban areas, some community members were using stove made of iron sheets. The use of FES was not a commonly observed practice. The products which were produced locally such as in *Awubare* were mainly designed for charcoal users. At *Awubare*, there were three producers, who acquired the skill from their families and have a capacity to produce six stoves and sell at same prices ranging from 50 to 70 Birr. It took two to three days to sell six stoves. However, in the other areas where data was collected, there were no producers that serve the local market. The major challenge that was mentioned by the producers was the cost of inputs that was often imported from Somali land with hard currency. For instance, to produce six iron sheet made stoves, it costs the producer around 10 Dollars. Besides, the producers' place of work is at the center of the market that makes it environmentally inconvenient for the producers and other business people. Another potential area of producers was cooperatives organized around Jigjiga district. Although attempts were made by different stakeholders to organize cooperatives,

those efforts don't have success stories due to various reasons. For instance, with the support of Environmental Protection, Mining, Forestry and Energy Development Agency, two cooperatives, namely *Birmal* and *Efteen*, were organized with 40 members and at a project cost of 300,000 Birr to produce FESs in Jigjiga city. The members were given modules and trainings as well as technical expert support on how to produce *mirt midijas*. However, the performance of the cooperative was not as anticipated by the agency and, at the time of data collection, both of them were nonfunctional. One of the main challenges that contributed to the failure of cooperatives was lack of resource and time commitment among the members in exerting efforts to achieve common objectives.

Currently, one of the most important actors in the promotion and demonstration of FESs in Eastern cluster was the government bodies at *wereda* and district level since the market failed to do so. Structurally, energy related works were under District Livestock, Crop and Rural Development Office. In line with this, the district offices in Jigjiga and Degahabur made attempts to distribute *Mirt Midija* to the pastoralist community for free. However, distributing the stoves by the government for free among the community was developing a sense of dependency on the government. Moreover, training was given to more than 150 households in Jigjiga district on the production of FESs and its applications at *Goana*, *Hadu* and *Belidkiya kebelles*. But no result was observed so far.

The engagement of NGOs, which are supposed to have a great role in the sector as per their mission, was minimal and unsustainable as far as this cluster is concerned. Accordingly, different NGOs implemented projects that elapsed without bringing sustainable remedies to problems related to energy especially on issues related to FESs. In this case, the role of GIZ has a paramount importance. As a partner in the region, GIZ provided training in collaboration with the government district livestock office to more than 150 households. Besides, the organization freely delivered two FESs (*Mirt Midija*) modules for two women association in Jigjiga district at *Goana* and *Beledke kebele*.

Retailers and wholesalers, which are the channels for distribution of energy efficient stoves, in the cluster were almost nonexistent. Their number was very limited and their engagement was haphazard. One retailer in *Degahabur* town was involved in selling *Lakech Midijia* in collaboration with Mercy Corps. The retailer indicated that she brought 350-370 stoves from Dire Dawa and sold it for three years. However, she stopped delivering the stoves due to high cost of transportation and damages during transportation due to the fragile nature of the product. Further, the retailer mentioned lack of finance as constraining factor. The absence of interest free loans that comply with their religious belief limited access to the retailers and producers in getting finance from conventional and micro financing institutions.

Different barriers were also mentioned by the experts working in this sector and participated in the focus group participants. Some of the most important barriers that hinder the development of the sector in this cluster, though many of them are similar with other clusters, were the following:

1. **Low Level of Awareness:** most of the participants in the focus groups discussion except in *Shinelle* wereda were not aware of the FESs benefits and where they are available;
2. **Product Incompatibility:** the stoves produced and attempted to be distributed were not consistent with the feeding habit of the community at large. Those stoves which were distributed, for instance, in *Degahabur* were not appropriate to cook *chapatti* and rice that were designed to bake *injera*.
3. **Product Affordability:** in areas such as *Jigjiga* and *Degahabur* where attempts were made to promote FESs, the experts and residents mentioned the cost of the stoves as constraints to use them. In some instances, participants in the discussion preferred to be given freely.

4. **Less Coordinated Effort:** efforts to promote FESs in the cluster were almost haphazard and sporadic, since the government bodies or nongovernmental organizations endeavors lack sustainability in their implementation, monitoring and evaluation.
5. **Weak Market Linkage:** the link between producers and retailers was very weak. A case in point was one retailer in *Degahabur* town who was fetching FESs (i.e. *Lakech*) from Dire Dawa. Due to high transportation cost, the price increased significantly. As a result, the retailer dropped FESs business.

Despite the fact that the aforementioned prevalent challenges are common phenomena in the study area, the following opportunities are making the sector promising in the area. These opportunities are:

1. **Readiness to Use:** most of the participants in the focus group discussion were interested to use FESs if they delivered at affordable price. This can be harnessed and utilized to promote FESs through awareness creation and product demonstration.
2. **Government Policy:** the government direction in the fight against environmental degradation and deforestation serves as greater input in the promotion of FESs among pastoralist community in this and other clusters as well. Zenebe *et al.*, (2006) revealed that the Ethiopian government has embarked on a two-pronged policy in an effort to stem deforestation and the degradation of agricultural lands: (i) tree planting or afforestation; (ii) dissemination of more efficient stove technologies. These pave the way for different stakeholders to work in collaboration with government bodies in planning and implementation of programs related with FESs in the pastoralist community.
3. **Presence of Traditional Producers:** for instance, in *Awubare* town, there were three producers working on iron sheet made. These producers if provided with necessary financial inputs, training, and materials and technical support, they may serve as potential producers in the future.
4. **Availability of Raw Materials:** some of the raw materials and inputs are available in the localities. For instance, sand is available in the cluster for making of *mirt midija*.

### 3.3. Afar Cluster Assessment

#### 3.3.1. The demand side analysis

The fire wood is commonly collected from the field by women and transported by their back. Using charcoal is not a common practice among the pastoralist community in *Gewane* and *Amibara* areas. Although the community collects fire woods from locality, it becomes scarce due to control imposed by the government to mitigate deforestation. According to the information obtained from experts and participant of focus group discussions in *Gewane* and *Amibara* weredas, the demand for FESs exists and needs efforts of promotion. Some of the focus group discussion participants made clear that the FESs under use in their locality were from the government programs for free. The major challenge was that the society's readiness to pay was minimal. Most of the participants demanded the government to deliver them for free. This might hinder the attempt to promote FESs in the localities unless the necessary awareness was created among the pastoralist. On the other hand, focus group discussion participant in *Aminbara* wereda were less exposed FESs technology and its benefits. Almost all the participants lack information about FESs although some of the products were available in the nearby market at *Melka-Werer* town.



Figure 6. Traditional Three Stone Stove at Gewane Afar Cluster

Traditionally, the community in the study areas made use of three-stone-stoves for cooking like other areas covered in this study. This made it difficult to cooking in rainy season. This stove had physical and health implication on women at the time of cooking. At the time of cooking, the community uses *mitad* made of clay and iron sheets especially to bake *quitta* and *injera*. These traditional stoves sometimes caused harm to children walking around the stove at the time to cooking. The smoke that comes from the stove also affects eye. In addition to this, the Afar community used a special cooking facility to prepare *mufee*. In the semi-urban areas, people use *mitad* made of clays in addition to traditional stove to prepare *injera*, *ambasha* and *quitta*.

The price of *mitad* in Gewane locality goes up to 250 Birr. As the information obtained from the experts working in the villagization program indicated, the request for FESs was increasing from time to time especially those who have exposure and observing the experience in the programs. As a result, a request is sent to the regional government for more supply. In addition to experts say, pastoralists who were participants of focus group discussion and have exposure to see the benefits of FESs are highly demand the product.

### 3.3.2. Supply side analysis

The supply of modern and fuel saving stoves was very limited in the cluster. Almost there was no single producer or supplier of FESs in the study area. Most of the time, *Gewane and Amibara*, stoves that are produced in Semera were distributed to those pastoralists participating in the villagization program by the regional government. Under this initiative, the stoves, made of cement concrete, were distributed for free to those who involve in agro-pastoral economic activity and people with some form of disability. *Wereda* administrative and pastoralist offices were responsible to distribute the stoves. In this initiative, an attempt was made by *wereda* offices to distribute more than 300 stoves to agro-pastoralists in *Gewane wereda*. Similarly more than 100 stoves were distributed for free in *Amibara wereda* in June 2014. Besides to the shortages, the residents in the cluster mentioned the price as a constraint which cost around 250 Birr.



Figure 7. *Mirt Mitad* stove ready to be distributed, Amibara Woreda office

The stoves distributed among the pastoralist were also less compatible with cooking tradition of the community. In most cases, the awareness among the community toward FESs was very low. This made the acceptance level of FESs less among the community. This required appropriate promotion and demonstration to shade the light among the community about the economic, health and environmental benefits of FESs. For instance, in Ambara *wereda*, more than two hundred *mitads* were found in the compound ready for distribution. The products were stored in a place where they can be exposed to damage. This resulted due to the less coordinated effort between the government bodies at *wereda* and regional levels. Moreover, the stoves were referred to as a poor quality which damaged in the process of transportation.

The availability of producers, retailers and wholesaler was almost non-existent. In due process of the study, the team came across one potential producer in *Gewane* named *Angela Alternative Energy Producer* that secured license but did not get any support from the government and non-governmental organizations to launch FESs production. The producer and rural development experts indicated that the raw material for the preparation of *mirt mitads* was available in the locality. Besides, the pastoralist and rural development *wereda* office experts expressed the readiness of the government to provide technical support for those who are interested to engage in the production and distribution of FES in the locality. In addition to this, there were retailers in *Melka-Werer* town that sell charcoal stoves fetching from Awash, Adama and Addis Ababa (see picture below). The transportation cost made the product less affordable to pastoralists. The support provided to producers was also limited.

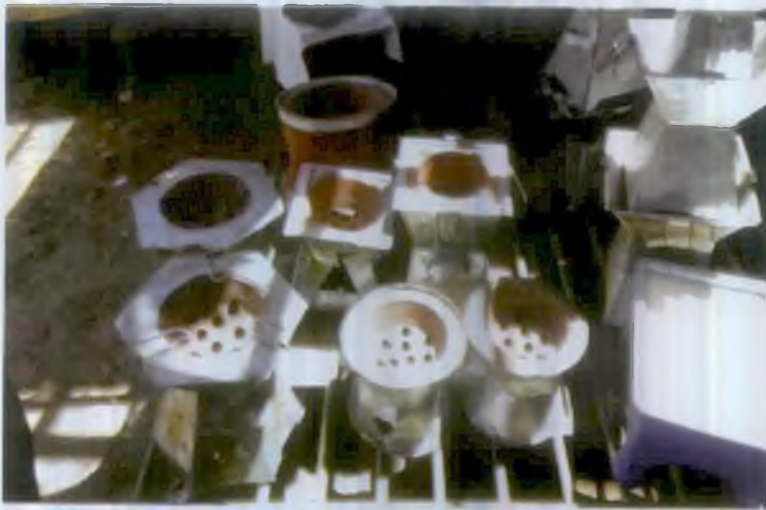


Figure 8. Sample stoves for sale, Awash Melakasa Town (Afar)

One experience that the team came across in the study was the youth cooperative involving in the production of charcoal-brickets in *Melka-Werer* town (see the picture below). This cooperative was organized by the town administration to use waste in the production of charcoal for house-hold and commercial use. The youth were producing on par-time base charcoal-brickets for the locality and other markets using wastes collected locally. Due to low level of awareness among the community and lack of market linkage, the sales volume was very less. Besides, the unavailability of stove that utilizes charcoal-brickets in the locality constrained its applicability in cooking and commercial activities. However, if the aforementioned hassles are relieved, the activity can be very good potential for both the producers and users in the locality.



Figure 9. Sample charcoal-brickets produced by youth cooperatives, Awash Melekasa town

Among the stakeholders in this sector the government role was significant. Almost in all areas of the study, some endeavors of introducing and promoting FESs were done among the pastoral and agro-pastoralist community by the regional government. The *wereda* administrative offices as well as pastoralist and rural development offices in collaboration with the regional government and few international NGOs were exerting efforts in the distribution and promotion of FESs as a strategy to fight deforestation and environments degradation. Moreover, the regional and local government bodies have the policy to support for those in need of starting business that engaged in the production of FESs compatible with the pastoralist cooking practices. Most importantly, the offices indicated that FESs and energy saving practices will be given a greater priority by the government in the preparation and implementation of development programs.

The role of non-governmental organization in the promotion and distribution of FESs was found to be minimal in the cluster. There were attempts by different international and local NGOs but the exercise did not produce the expected result. FAO for instance was active in *Gewane* and *Ajambo* *wereda* and attempted to install bricket producing machine by importing a machine from India. Due to lack of electricity and technical limitation, the machines were not functional. That could be a great potential for the area if the necessary arrangement could be made. Another attempt in this area was made by Farm Africa, a project implemented in 2011-2013 in *Gewane*, *Amibara* and *Awash Araba* designed to introduce charcoal-bricket production using waste and *prosopis*. In line with the project objective, 30 people were trained and organized in cooperatives and three machines were distributed in the three *weredas*. However, the attempt did not produce the expected result due to lack of electricity, limited market linkage, and conflict among cooperative members.

Different barriers were mentioned by the experts working in this area and focus group discussion participants. Some of the most important barriers were the following:

1. **Low Level of Awareness:** most of the participants in the focus groups discussion in *Amibara* *wereda* were not aware of the FESs benefits and availability. However, to some extent, those participants in *Gewane* *wereda*, where the villagization program is under implementation, have awareness.
2. **Product Incompatibility:** the stoves produced and attempted to be distributed were not consistent with the feeding habit of the community at large.
3. **Product Affordability:** the *wereda* experts and residents mentioned the cost of the stoves as constraints to use them. In some instances, participants in the discussion preferred to be given for free.
4. **Less Coordinated Effort:** efforts to promote FESs in the cluster were almost haphazard and sporadic.
5. **Weak Market Linkage:** the weak market linkage was visible in *Aminbara* *wereda*. The youth who engaged in the production and distribution charcoal-bricket are best examples. Although they produce the product but could not find a buyer as well as user in their locality.

Despite the fact that the aforementioned challenges avail in the area, there were also some opportunities that made the sector promising in the area. These were:

1. **Readiness to Use:** most of the participants in the focus group discussion were interested to use FES if delivered at affordable price. This can be harnessed and utilized to promote FESs through awareness creation and product demonstration.
2. **Government Policy:** the government direction in the fight against environmental degradation and deforestation serves as greater input in the promotion of FESs among pastoralist community in the cluster. In addition to this, the villegazation program under implementation in the Awash Basin area paved the way to reach large number of people in the cluster. The experience and attempt of



the regional government to promote FESs created a fertile ground for future interventions in the sector. Hence, different stakeholders can work in collaboration with government in designing and implementing programs that focused on FESs activities the pastoralist community.

3. **Presence of Licensed Producers:** the presence of potentially licensed producers in Gewane and Melka-Werer towns may serve a starting point in the production and distribution of FES in the Cluster.

#### 4. CONCLUSION AND RECOMMENDATION

##### 4.1. Conclusion

Based on the findings illustrated in the above sections, the following conclusive remarks were drawn. In many part of Ethiopia, despite some efforts made by the government and Non-governmental organizations so far, its overall performance is not satisfactory (Amogne, 2014<sup>b</sup>). The study area is not an exception. In this sector different stakeholders are involved, but the access of FESs among the pastoralists is almost non-existent. There is very limited number of producers, wholesalers and retailers in the area. To mention in number; *Awbare* wereda has three local producers and two retailers, *Dagahabour* wereda has no producer and only few retailing shops in the main market place, *Shinille* wereda has no producer and no retailer rather the community buys FESs from *Dire Dawa* market. *Gewane* wereda has no producer and no retailer rather they try to use *Awash* market. However, one producer was planning to produce and distribute FESs at *Gewane*, but it needs technical and financial support. At *Amibara*, there was no single producer, but one retailer was operating. At *Yabello* and *Dire* weredas, there were four and single producers respectively with and few retailers in the market. Besides, *Moyale* wereda has two producers and uses *Gambo's* (border market place of Kenya) market to import fuel efficient stoves. Similarly, *Liben* wereda has four producers and few retailers.

In addition to their limited number, the products produced and distributed by market actors was not demand driven and not convenient to fit cooking practice of pastoralists. The stoves were directly adopted from a technology in use among highlanders to bake *Injera*. Despite the fact that pastoralists had limited access to FESs, the experience varies from wereda to wereda in the PRIME intervention areas. Pastoralist and agro-pastoralist areas which are closer to big cities and borders had better access for FESs. Comparing to other areas, *Awubere* and *Moyalle* weredas had better access to FESs due to imports from *Somaliland* and *Kenyan* markets, respectively.

The pastoralists also had information about FESs in one way or another. They showed interest to use FESs and they wanted to have it. However, most of them considered the FESs expensive by comparing the price with the traditional ones without giving due attention to the economic and health benefits. The gap in awareness coupled with limited purchasing capacity among the pastoralists was constraining FESs market development in the intervention areas, despite the fact that the area has potential which can be cultivated by a coordinated effort of stakeholders.

Generally, from assessment made in the three clusters, the following challenge can be considered as the major constraining conditions that hinder the use of FESs among the pastoralists.

- ◆ Most of the cook stoves produced and distributed in the areas based on the highlanders' experience which is very different from the food cooking practice of the pastoralists.
- ◆ In some areas, due to lack of charcoal, the society used firewood as a fuel for charcoal cook stoves, this made the FESs less efficient.
- ◆ Low level of awareness about long run benefit of the product among the pastoralists.

- ◆ There was lack of coordination among different stakeholders and actors. This calls for coordinated effort of producers, distributors, government offices and non-governmental organizations.
- ◆ Energy offices in all clusters areas were not staffed with adequately trained workforce compared to the effort required to improve the sector.
- ◆ Limited purchasing power of the pastoralists to buy and use FESs.
- ◆ Due to weak market linkage in the sector, mostly fuel efficient stoves were not accessible for the majority of residents in the areas which were covered during the assessment.

#### 4.2. Recommendation

From policy, administrative and market perspectives, the FESs market, as it can be learned from the assessment, requires greater attention from different stakeholders and market actors. Hence, in line with the finding of the assessment, the following recommendations need to take into account in designing and implementing future interventions.

- ◆ Capacity building training should be provided for local producers to produce FESs which is customized for pastoral areas staple food, their family size and the available fuel sources. And most importantly they have to be aware the available resource that can be used for the build-up of FESs.
- ◆ There is a need to carry out awareness creation and product promotion campaign about the benefits FESs in the intervention areas.
- ◆ Improve the number and quality of workforce working in the energy sector in pastoral area.
- ◆ Coordinating efforts and intervention by various stakeholders to avoid repetition of interventions and reducing wastage of resources.
- ◆ Effort shall be exerted in market development and creation of market linkage among producers and retailers operating in the locality.
- ◆ Producers and other stakeholder should take into account the cooking practice of the pastoral community in designing, producing and distributing customized FESs.

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## 6. ACKNOWLEDGMENT

We are highly thankful for PRIME project and Haramaya University for their financial and material support, respectively. The three field officers of HU-PRIME, namely, Adamu Tefera, Ahmed Ismail and Degu Worku deserve special thanks for their unreserved effort in facilitating the field works and their involvement in the data collection. We are also indebted to Mrs. Mahlet Seifu and Mr. Netsalem Bahiru (IR3 technical advisors of PRIME project) for their constructive comments to improve the quality of the paper. Last but not least, we are very much thankful for the support we have received from Mr. Mohammed Seid (MC, Negelle) during the data collection.

## MICRO INSURANCE MARKET AS A COPING STRATEGY TO DIFFERENT ENVIRONMENTAL SHOCKS IN PASTORAL AREAS: PROSPECTS AND CHALLENGES

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### EXECUTIVE SUMMARY

*Pastoralists live in arid and semi-arid areas that experience different livelihood shocks due to changes in environmental, social and economic circumstances. Pastoralists are highly vulnerable to repetitive livelihood shocks due to droughts which devastate their livestock. If the level of livestock loss is to be minimized and their livelihood maintained after drought, a form of micro-insurance could be considered. Ethiopian pastoralists, like other east African pastoralists, have been using for generations a wide variety of informal insurance mechanisms as strategies to cope with different shocks. But provision of tailor-made micro-insurance to pastoralists is not yet fully materialized in Ethiopia. This research was conducted to study the existing formal and informal insurance products in pastoralist areas. Using the case and survey based studies in Afar and Somali pastoralists of Ethiopia, the research investigated: (a) the main formal and informal livestock related insurance products available among pastoralists, (b) the perception and willingness of pastoralists to buy formal insurance to cope with the livelihood changes due to drought, and (c) the major challenges and opportunities to make the livestock insurance products sustainable to pastoralists.*

*The study showed that both in Afar and Somali regions, pastoralists have strong clan based informal insurance networks as a means of coping to different livelihood shocks. Informal insurance can be provided in the form of livestock, livestock products, and cash. Among the sampled pastoralists, about 80% and 48 % participated as informal insurance contributors and recipient in the last five years, respectively. Majority of contributors made it for sharing the social obligations, gifts given during marriage (61%) and blood compensation (23%). About 44 % of the contributors made the contributions for livestock losses due to drought and/or livestock diseases. About 91% of sampled pastoralists had a good perception on the relevance of insuring their livestock from droughts through formal insurance mechanisms. Yet cattle and goats were the first and second priority livestock types to be insured from the drought.*

*The study also showed that though pastoralists are willing to buy the formal insurance, sustaining the same will still largely depend on the willingness of government and NGOs to subsidize insurance premiums and/or product design and marketing. It is also recommended that micro-insurance, as a new product, need to be promoted well among pastoralists, and more importantly clan leaders and elders. Linking the marketing and payment schemes with local cooperatives and micro-finance institutions will minimize operation cost and access to finance. Moreover, targeting better-off pastoralists as entry*

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*point to the micro-insurance distribution will have dual effect of strengthening both the formal and informal insurance mechanisms in pastoralist contexts.*

## 1. INTRODUCTION

Pastoralists and agro-pastoralists of Ethiopia live in arid and often remote areas that experience a number of different livelihood shocks. As a result, pastoralists are increasingly facing pressures from different risks that are related to environmental, social and economic factors. With respect to the environment, for example, recurrent droughts and livestock disease are resulting in livelihood asset shocks to the pastoralists. There is growing evidence that frequency and severity of droughts are increasing overtime (Pavanello, 2009). Due to the multiple risk exposures and limited capacity of pastoralists to cope with the shocks, increasing vulnerability have become characteristics for many pastoralist in many areas. Thus, irrespective of pastoralists' livestock wealth level, they remain highly vulnerable to repetitive livelihood shocks. To minimize the level of livelihood shocks that result from livestock losses due to droughts, a form of insurance coverage could be important to pastoralists

The concept of insurance is not new to Ethiopian communities; they have practiced their informal insurance such as *Iddir*, *Iqub* and *Bussa Gonofa*. Even agricultural communities such as pastoralists who are largely located in remote areas have readiness to accept formal insurance product (Smith and Chamberlain, 2010). Yet insurance service coverage in Ethiopia, both micro and general, is very limited (Wolday *et al.*, 2013). Although there has been efforts in building micro-insurance service providers in Ethiopia (such as insurance companies, and deposit taking micro-finance institutions), provision of tailored made micro-insurance services to the needs of low-income agricultural households such as pastoralists is not yet fully materialized (Wolday *et al.*, 2013). It is a recent phenomenon that Ethiopian financial service providers have begun to provide micro-insurance schemes such as weather index insurance in Borana by Oromia Insurance, and livestock indemnity insurance in Tigray by Africa Insurance. Developing an appropriate insurance service for pastoralists will have crucial role in managing risks associated with environmental shocks and transferring drought-related livestock mortality risks to third party.

The overall objective of this study is, therefore, to assess marketing aspects of existing formal and informal insurance products in Afar and Ethiopian Somali regions of Ethiopia. The specific objective of the study were to: i) identify the major risks to (agro) pastoralist production system in Afar and Somali regions that demand insurance, ii) assess the perception and willingness of pastoralists to buy formal insurance product to minimize their risks, iii) the major challenges, and opportunities to make the livestock related insurance products commercially sustainable to pastoralists.

## 2. THEORETICAL FRAMEWORKS

### 2.1. Concept of Risk and Insurance

Pfeffer (1956) defines insurance as "a device for the reduction of risk of one party, called the insured, through the transfer of particular risks to another party, called the insurer, who offers a restoration, at least in part, of economic losses suffered by the insured". An insurance agreement is, therefore, a mutual co-operation between two parties to protect one of them from unexpected future asset or financial loss (Hussain and Pasha, 2011). Under conventional setup the main viewpoint of insurance is to minimize the risk. Risk is a probability or threat of damage, injury, liability, loss, or any other negative occurrence that is caused by external or internal vulnerabilities and that may be avoided through pre-emptive action. Risks

can be categorized as idiosyncratic or covariate based on their breadth of causality (Llanto *et al.*, 2007). Idiosyncratic risks (individual risks) occur when only one or a few individuals or households in a community suffer losses (Llanto *et al.*, 2007). On the contrary, covariate risks (aggregate risks) affect a large number of households, which can be entire communities or regions within a country or countries. Consequently, all people are equally exposed to such risks (Llanto *et al.*, 2007).

Smallholders in developing countries face numerous sources of risk. Much of this risk is directly related to agricultural production: years of low rainfall can reduce crop yields dramatically, or cause the death of livestock because of shortage of feed and water (Burke *et al.*, 2010). In the absence of savings, credit, or insurance, a drought year can force households to liquidate productive assets or curtail consumption, with large negative implications for their livelihood. Informal risk management strategies, where they exist, are typically unable to protect against common local weather shocks (covariate risks): when all farmers or pastoralists in a village or broader region experience a drought, risk pooling across households provides little effective insurance (Burke *et al.*, 2010).

Currently, the institutional response to disasters such as droughts in the majority of low income countries is remedial, with little attention paid to prevention or ex-ante risk management schemes (Burke *et al.*, 2010). New approaches in agricultural insurance markets have the potential to helping agricultural producers smooth incomes in bad years, and also helping governments and relief agencies respond quickly and fully to weather-related disasters when they occur. Principal among these new approaches is *indexbased insurance*, which links indemnity payments to easily and publicly observe outcomes (such as rainfall) instead of to individual farmer yields, as is typical in traditional insurance (Virginia *et al.*, 2012).

## 2.2. Micro-insurance

Traditional insurance distribution systems are not designed to serve low income markets: It is with limited incentives for agents and brokers who focus on large number policies or sales instead of servicing (Bicner and Eling, 2012). The lack of access to formal risk management mechanisms for the majority of the world's smallholders means that households are forced to self-insure against catastrophic events such as drought (Cole *et al.*, 2012). Informal risk management methods, however, provide only limited coverage (Cole *et al.*, 2012). As a consequence, a micro-insurance scheme is largely designed to address the untouched areas through the provision of insurance product. Micro-insurance is thus a mechanism to protect poor people against risk (e.g. accident, illness, death in the family, and natural disasters such as flood or droughts) in exchange for payments tailored to their needs, income, and level of risk. It is aimed primarily at the developing low-income smallholder producers, especially those in the informal economy who tend to be underserved by mainstream commercial and social insurance schemes.

Micro-insurance, though meant for low-income population and provided by a variety of different entities, run in accordance with generally accepted insurance practices and principles (International Association of Insurance Supervisors, 2007). Micro-insurance allows policyholders to recover and rebuild after a crisis. It can mean avoiding difficult, often devastating risk coping measures such as eating less food, or selling productive assets. It promotes resilience and contributes to the Millennium Development Goals, including reducing hunger and child mortality, and improving maternal health. There are differences between the conventional insurance and micro-insurance schemes with premiums, policies, claims, delivery channels, and control efficiencies (see Table 1).

Table 1. Conventional insurance and micro-insurance

Element	Conventional Insurance	Micro-insurance
Premiums	Typically regular annual, quarterly, monthly, based on age or other specific risk characteristics, and collected regularly.	Frequent or irregular premium payments, group pricing with links to other services.
Policies	Complex policy document, much exclusion, usually annual terms.	Simple language, few to no exclusions, terms appropriate to market, may require life and none life benefits
Claims	Claims process for large sums, insured may be quite difficult	Claims process for small sums, insured is simple yet still controls fraud, rapid claims processing
Delivery Channels	Sold by licensed agents or brokers to wealthy, middle class, or companies that typically understand insurance.	Often sold by unlicensed traditional agents to low-income persons, preferably in groups requiring significant consumer education
Control efficiencies	Screening requirements may include a medical examination, or other tests.	If there are any screening requirements, they are very limited to keep costs low.

Source: Adapted from: *International Association of Insurance Supervisors (2007.)*.

The provision of microfinance is more prevalent in certain regions than others, with certain products often finding particular popularity in specific countries. One of the largest markets for micro-insurance, however, remains to be in Africa, where lack of resources or infrastructure and heavy reliance on agriculture has stimulated growing interests in credit, life, funeral and agriculture protections (Virginia *et al.*, 2012). There are several issues that challenge a wider distribution of micro-insurance to the low income segments of a society, including lack of awareness, relative costs, and lack of quality data on risk (Allen and Overy, 2012).

*i) Lack of awareness:* One of the major challenges facing the micro-insurance sector is lack of awareness about insurance itself and insurance products among people with low income. Due to a lack of information about the benefits of insurance, people are often wary of it. They prefer to rely on traditional arrangements or religious practices. This viewpoint means that fewer people in lower income families would consider taking out insurance which in turn leads to a lack of demand (Allen and Overy, 2012).

*ii) Relative costs:* Micro-insurers applying standardized methods find that operating costs are very high due to the different circumstances they face in target markets: including trying to reach a population spread out over a large area. Many large insurers do not have much experience of selling to people on low-incomes, which can be a barrier to entry. It can be extremely difficult to tailor what essential paperwork is required to the understanding of the target market.

*iii) Lack of quality data on risk:* The lack of quality data makes it difficult to assess and price the risk. Insurance products need to be reasonably priced to attract consumers but they also need to be profitable. If insurers can tailor the insurance to the needs of low income population, this also means they will be more likely to sell it.

### 3. METHODOLOGY

This study used both case study and structured survey based approaches to collect pertinent information regarding the existing informal and formal insurance products among the pastoralists in Afar and Ethiopian Somali regions. Data were collected from March to June, 2014. The case study employed desktop reviews on the concept of insurance in general and micro-insurance product in particular. Key informant interviews were conducted with government sectoral offices and insurance operators including officials from National Bank of Ethiopia (NBE), Association of Ethiopian Micro Finance Institutions (AEMFI), Nyala Insurance, Africa Insurance, Oromia Insurance, Ethiopian Insurance, Pastoralist Forum Ethiopia (PFE), ILRI, Somali Micro Finance Institute (SMFI), Somali Region Pastoral and Agro-pastoral Research Institute (SORPARI), Al-Habi Hide and Skin Cooperatives, and Agriculture and Livestock bureaux, Cooperative Promotion bureaux, Disaster Prevention and Preparedness bureaux (DPPB) of the two regions. The study employed open-ended questions that were intended to solicit the intentions and practices of pastoralists in involving in the informal and formal insurance products.

Based on the results of the case study, questionnaire was designed and administered to 124 pastoralists in the two regions: 66 from Ethiopian Somali and 58 from Afar. Random sampling technique was used to identify kebeles and then households from Shinille, Gebribeyah, Tulli and Awbere districts of Ethiopian Somali, and Gewane, Gallealo and Awash Fentale district of Afar regions. While testing the perception and willingness of pastoralists to purchase drought insurance, a hypothetical insurance product was designed (in the context of pastoralists) and then read to them to respond using a Likert type five point scale.

### 4. FINDINGS AND DISCUSSIONS

#### 4.1. Major Risks to (Agro) Pastoralist Production System that Demand Formal Insurance

The major risk types associated with pastoralist production system included droughts, flood, livestock disease, and predators. About 81 percent (101) of the sampled respondents' ranked drought as their first severe risk (see Table 2).

Table 2. Major risk types to (agro) pastoralists in Afar and Somali regions

Risk type	Number of respondents ranking the risk as first	Percentage
Drought	101	81.5
Livestock disease	21	16.9
Crop pest risk	1	0.8
Other risks (e.g. predators)	1	0.8
Total	124	100

Source: *Field survey, 2014.*

The actual number of livestock loss also reinforces the aforementioned ranking of the respondents. The most critical risk type that the pastoralists faced was drought, which was followed by livestock disease. Numerical illustration showed that out of the total loss of 7,526 head of livestock since 2000 E.C., drought together with livestock disease accounted for about 98 percent of the livestock losses (see Table 3).



Table 3. Livestock loss across risk and type in Afar and Somali regions

Risk type	Livestock losses				Total	Percentage
	Camel	Cattle	Goat	Sheep		
Drought	108	564	2145	1149	3966	52.7
Disease	135	830	1816	692	3473	46.15
Flood	0	22	20	0	42	0.56
Other risks	7	20	7	11	45	0.60
Total	250	1436	3988	1852	7526	
Percentage	3.32	19.08	52.99	24.6		

Source: Regional livestock offices, 2014.

The majority of the loss (53 percent) was registered for goats, followed by the loss of sheep (25 percent). The loss of livestock can bring a critical decline in the livelihood of pastoralists. But pastoralists might rank differently among the different livestock types regarding their critical importance to their livelihood. In this regards, about 43 percent and 27 percent of the sampled pastoralists indicated that loss of cattle and goat, respectively had critical implication on their livelihood.

There were traditional and scientific early warning systems for risk mitigation. Most of the sampled pastoralists (76 percent) in Afar and Somali Regions indicated that they rely on the weather prediction of the tradition forecasters (Table 4). Locally, the traditional forecasters are called 'Hutukobiya' and 'Xidigiye' in Afar and Somali regions, respectively. This may mean that any intervention for the early warning information to pastoralists needs to be reconciled with the traditional weather forecasts of pastoralists.

Table 4. Pastoralists' trust level on sources of early warning information

Source of early warning	Number of respondents who trust the source	Percentage
Traditional	76	61.3
Experts from NGOs and others	38	30.6
Experts from government bureaus	10	8.1
Total	124	100

Source: Field survey, 2014.

Though the traditional weather forecasting technique is widely trusted among the pastoralists, majority of the respondent (83 percent) do not have any clue about the forthcoming rain fall situation in their locality. This may mean that pastoralists' level of advance assessment on the rainfall conditions is relatively low.

## 4.2. Informal insurance in Afar and Ethiopian Somali regions

### 4.2.1. Types and scope

In both Afar and Somali regions, pastoralists have social exchange systems which involve contribution of livestock, livestock products and other items; as compensation to different risk exposures and social obligations. This is a reciprocity based social assistance system that helps pastoralists to share asset loss due to different environmental shocks such as droughts. Therefore, any form of social support and risk sharing practices among pastoralists can be considered as an informal insurance product. This informal

insurance can be provided in different forms of compensation; cash, food items, livestock or livestock products such as milk. Both in Afar and Somali regions, the informal insurances have also religious, kinship and neighborhood bases.

*a) Religious beliefs:* In both Afar and Somali regions; Islam is the dominant religion where its rulings encourage the better-off followers to assist the poor ones. This religious rule helps to redistribute wealth and risk within the society. The most well-known social support system rooted in religious beliefs is *zakat*. *Zakat* is a religious obligation on every Muslim to make monetary or in kind contributions to the poor and destitute ones.

*b) Kinship:* As pastoral resources are often managed on a collective basis, their informal insurance mechanisms are often kinship-based. As a result, livestock and other assets circulate regularly within clan members from the better-off to the poorer.

*c) Community relations:* Pastoralist households sometimes request for support from neighbors even during normal times in order to meet their needs. Pastoralists often use sharing of lactating animals or their milk products to maintain social ties. Based on the relationship of the recipient household and the wealth level of the donor, beneficiary household may be entitled: the lactating animal, only the milk of the lactating animal, or only the offspring of the lactating animal. Access to this type of support is related to 'belonging' in the community.

Pastoralists who relatively have good network with clan members, relatives, friends and marriage relationships with wealthy family manage to recover easily after crises with the assistances obtained from their network. Among Somali pastoralists, there is strong reciprocity assurance system during social and economic crisis called '*Xoohologiyu*'. Under the '*Xoohologiyu*' upon a request of victim fellow community member (often via their clan elders) clan members contribute livestock to indemnify the loss. '*Xoohologiyu*' is administered by clan elders where elders committee decides the need for making contribution to a clan member's loss (see also Table 5). When there is a need for contribution, the elders committee determines each community members' share of the contribution based on his/her wealth level. In this regard, the clan members are required to absolutely comply with the decision with the pain of punishments and fines of additional livestock. The recipient can only get his/her clan members' support once for a certain risk type such as drought. According to the interview conducted with clan elders, the total clan contribution can be enough to restore pastoralist's livelihood within few years. Sometimes, clan members' contribution might be greater than the loss, and the victim will end up with a profit out of the risk.

Under '*Xoohologiyu*', households are only entitled to get the support if they have lost almost all of their livestock and have no any other means to revive their livelihood without the support of their relatives and clan members. But the clan members have to be in good wealth level to contribute to others at the time of the risk occurrence. Therefore, '*Xoohologiyu*', is not functional for covariant risks, such as drought, since almost all pastoral households might experience livestock losses. Therefore, in the absence of formal insurance for covariant risks, pastoralists have only self-insurance options to withstand with drought since it is not covered by the informal insurance system.

Table 5. Informal insurance support types among Somali pastoralists

Type of support	Nature of support	Incidence type	Provider	Recipient
Hirsi	Giving milk as a gift to relatives or neighbors	Dry season or drought	A relative or a neighbor	A relative or a neighbor
Mala	Lending of lactating animal for milking to a relative or a neighbor. The lactating animal and the offspring will be returned back to the lender.	Dry season or drought	A relative or a neighbor	A relative or a neighbor
Mag/Dhiig	Clan members' and relatives' contribution of birr equivalent of camels to their clan member who has to pay blood compensation	Clan member kills a person	Relatives and clan members of the killer	Victim's family members
Mawloxo	Clan members' and relatives' contribution of birr equivalent of camels to their clan member who has to pay compensation for causing physical injury.	Clan member causing physical injury.	Relatives and clan members of the aggressor	Injured person or his/her family
Kaalo	Gifts given in terms of livestock during marriage to support newly married couple as well as to serve as inducement to the bride's family to give their daughter.	During marriage	Family members and relatives of the groom.	Bride's family and the couples.
Zakat	A religious obligation of every Muslim to make monetary or in kind contributions to the poor.	Fasting periods of Muslims	Wealthy households	Poor households

Source: Field case study, 2014.

Among the Afar pastoralists the tradition/informal insurance schemes are also common. Some of them include the 'Fihima' and 'Erbonta'. 'Fihima' is a contribution of the clan members for blood compensation after one of their member is penalized for his violence for inflicting physical damage or loss of life. 'Erbonta' is a contribution of clan members during the time when one of their members faces loss of livestock due to drought, raids or predators.

#### 4.2.2. Pastoralists' participation in the informal insurance

Pastoralists were asked whether they had participated in the informal insurance practice. Many of the respondents stated that they participated either as contributors (80.3 %) or recipients (47.5 %) in the informal insurance (see Table 6). Accordingly, the number of pastoralists participated as contributors was higher than the number of recipients. This might be due to the fact that the wealth level of the majority of pastoralists was better during the last five years since there was no major drought occurrence in the same period in the Afar and Somali regions.

Table 6. Pastoralists' participation in the informal insurance in Afar and Somali regions

	Pastoralists contributed to the informal insurance support		Pastoralists who received support from informal insurance	
	Frequency	Percent	Frequency	Percent
Yes	98	80.3	58	47.5
No	24	19.7	64	52.5
Total <sup>1</sup>	122	100	122	100

Source: Field survey, 2014.

Many of the respondents who did not contribute to the informal insurance in the last five years indicated that they were willing to contribute but there was no request by clan leaders. Significant proportion of the sampled pastoralists who did not receive any support in the last five years responded that there were no livestock losses or other social obligations for them to request the support of others.

Table 7. Number of contributors, and livestock contributed along coverage type in Afar and Somali Regions

Coverage	Pastoralists involved in the informal contribution (and livestock numbers)				
	Camel	Cattle	Sheep	Goat	Total
Drought	0 (0)	7 (13)	11 (66)	17 (50)	35
Diseases	0 (0)	2 (3)	6 (14)	5 (9)	13
Blood compensation	3 (8)	7 (38)	7 (24)	6 (34)	23
Marriage	5 (10)	19 (36)	15 (50)	22 (66)	61
Other	0 (0)	0 (0)	16 (132)	7 (49)	23
Total	8 (18)	35 (90)	55 (286)	57 (208)	

Source: Field survey, 2014.

Among the sampled pastoralist respondents who indicated to have contributed to the informal insurance in the past three years, 35 and 13 of them have made their contributions for livestock deaths due to drought and livestock diseases, respectively. But majority of them have made their contributions for sharing social obligations of their informal insurance network member; gifts given during marriage (61) and blood compensation paid for victims (23). In terms of the livestock type, sheep and goat are the most common contributions with 286 and 208 number of contributions, respectively (see Table 7). This may be justifiable since small ruminants are less expensive, and pastoralists usually have large herds of small ruminants than camel and cattle. Cattle are also important type of contribution next to sheep and goat. Camels are seldom used for informal insurance contributions except in times of blood compensation and marriage. This may be due to the fact that camels are more expensive to give as contributions.

<sup>1</sup> Two pastoralists failed to indicate their contribution to the informal insurance.

Table 8. Number of receipts, and livestock received along the coverage type in Afar and Somali regions

Coverage	Number of pastoralists who received livestock through informal insurance (and livestock numbers)				
	Camel	Cattle	Sheep	Goat	Total
Drought	1 (1)	8 (14)	10 (41)	9 (59)	28
Diseases	2(2)	1 (1)	8 (63)	1(3)	12
Blood compensation	0 (0)	0 (0)	0 (0)	1(3)	1
Marriage	1(1)	19 (36)	2 (8)	9(24)	31
Other	0 (0)	1 (1)	2 (2)	3 (8)	6
Total	4 (4)	29 (52)	22(114)	23 (97)	

Source: Field survey, 2014.

On the recipient's side, 78 of the sampled pastoralists indicated that they received some sort of support from the informal insurance in the past three years. But majority of informal insurance recipients received support as sharing of social obligations than as coverage to the most critical risks of pastoralists, i.e. drought and livestock disease. For instance, 31 of the respondents received the support during marriage which mostly came either as cattle or goat. Yet, 28 respondents indicated that they received informal insurance support as a compensation for asset loss due to drought. Goat, sheep and cattle werethe main type of compensations made for drought loss. Generally, sheep (114 heads) and goat (97 heads)werethe most common livestock contribution that the respondents indicated to have received as support from their network (see Table 8).

For questions related to informal insurance contributions, quit significant number (34%) of respondents made informal insurance contributions for compensations to be paid as blood money. However, only five percent of the respondents indicated to have received such contribution. This may be because the respondents were afraid to openly acknowledge this type of compensations which they paid for physical injury or death they caused to other fellow members.

Pastoralists in Afar and Somali regions were currently dependent on the informal (traditional) reciprocity based insurance mechanisms, partly due to absence of alternatives, to mitigate unforeseen livelihood shocks such as droughts. But majority of informal insurance recipients received support as sharing of social obligations than as coverage to the most critical risks of pastoralists such as droughts. In addition, though existing informal insurance systems address wide-range risks, their coverage was limited to family or clan members.

#### 4.2.3. Lessons learned from the informal insurance of pastoralists

The following are the main lessons learned from the informal insurance of pastoralists.

*i) Informal insurance as restocking mechanism:* The existing informal insurance practices of pastoralists often serve as restocking mechanisms. Beyond serving as insurance against shocks, informal insurance also supports the recovery process after crises as restocking mechanism. However, in times of severe drought, the informal insurance may not serve as effective restocking mechanism since the drought might affect the livelihood of almost all pastoralists within their support network.

*ii) Limited risk coverage:* The existing informal insurances often make compensations only for pastoralists who have lost all of their livelihood assets and have no any reserve capacity to recover. And pastoralists

who lost some portion of their assets were not compensated. Even those who lost all of their assets may not be fully compensated to reinstate to their earlier (pre-shock) wealth level. They are usually compensated only to the asset level that is assumed to be enough to recover within a certain time period.

*iii) Inability to manage covariate/collective risk:* All informal insurance practices are basically reciprocity systems where better-off households contribute to severely devastated households. However, during drought, the reciprocity assurance system becomes less effective for the reason that all community members find themselves in the same boat with respect to covariate risk. Therefore, although pastoralists' informal insurance practices have effectively made inter-household transfers as insurance against individual (idiosyncratic) shocks, it often does not offer insurance against collective (covariate) shocks.

*iv) Weakening with time:* According to case study interviews conducted, most of the respondents claimed that traditional system of risk sharing among pastoralists was in decline. They often attribute it to the reduction of resource base for pastoralists due to recurrent droughts and increased urbanization in pastoral areas. The increased urbanization trend has strong influence on monetization of livestock products and the community's way of life into individualism than collectivism. Supplies of food aids and restocking interventions by the governments and NGOs are also claimed to contribute to the weakening of the pastoralists' traditional informal insurance.

### **4.3. Pastoralists' Perception about the Importance and Willingness to Buy Formal Insurance**

#### **4.3.1. Legal and institutional frameworks of micro-insurance**

The central bank of Ethiopia (NBE) is the policy-maker, regulator and supervisor of the insurance industry in Ethiopia. Not only insurance companies, mainstream insurers or micro-insurance company, but also micro financial institutions (MFI) can engage in micro-insurance business (Proclamation No. 626, 2009; Proclamation No. 746, 2012; Directive No. SIB/1.2015). Insurance companies have started issuing micro-insurance policies even before the introduction of the long awaited directive that authorized them to execute micro-insurance policy.

The new directive lists down micro-insurance products which include crop and livestock insurances on indemnity basis, and also weather index insurances. Practically, micro-insurance can be developed and delivered by different institutions including insurance companies, mutual funds, MFIs, NGOs, and governments or semi-public bodies. However, it is only insurance companies and MFIs which are allowed, by law, to issue micro-insurance policies in Ethiopia. Yet other providers such as cooperatives can be used as agents of the insurance companies and deposit-taking MFIs (Wolday *et al.*, 2013). More importantly, as large insurance companies in Ethiopia usually operates in urban areas targeting corporate and wealthier communities, MFIs can capitalize on their geographical proximity and existing infrastructure to better grab greater market share.

Some insurance companies and MFIs have started offering the micro-insurance policy to pastoralists and farmers even before the issuance of a separate regulatory framework. However, these attempts are either pilot projects initiated by international partners like I.I.R.I, IFPRI, World Bank, Oxfam America and International Labor Organization (ILO), or credit-life insurance policies offered by MFIs to insure repayment of loans. Formal insurance companies that currently offer micro-insurance to pastoralists and farmers in parts of Ethiopia include: Nyala Insurance, Oromia Insurance, Africa Insurance, and Ethiopian Insurance Corporation (pilot level). There are also many MFIs who deliver (or serve as channels) the micro-insurance product to pastoralists and farmers, including: Oromia Credit and Saving Institution, Addis Credit and Saving Institute, Gasha Microfinance Institution, and Dedebit Credit and Saving

Institution. Despite these developments, formal micro-insurance product is not yet commercialized to pastoralists and farmers in the Afar and Somali regions.

The only exception regarding the micro-insurance to pastoralists in Ethiopia is the case of Index Based Livestock Insurance (IBLI) in Borana area that is marketed by Oromia Insurance through regional MFI. Such 'index-based' micro-insurance products promise to offer a financially sustainable mechanism to reduce the risk faced by agricultural households. Index-based micro-insurance overcomes many of the challenge faced by crop insurance program by delinking indemnification from individual production (Cole *et al.*, 2012). Index insurance may provide less-costly and more-transparent risk management than other alternative products, enabling smallholder agricultural producers to make more productive investments and better manage consumption risk (Cole *et al.*, 2012)

#### **4.3.2 Pastoralists' perception about the importance and willingness to buy formal insurance**

Many factors affect the demand for micro-insurance by smallholder agricultural producers and pastoralists including; perceptions and attitude toward insurance; risk management substitutes; affordability (cost of coverage and payment mechanisms); poverty level (purchasing power); and frequency of risk occurrence (Llanto *et al.*, 2007). In existing literature on micro-insurance, studies measure willingness to pay for index based insurance using a hypothetical insurance policy (Cole *et al.*, 2012). The price of insurance that is affordable to low-income households may be less than the cost at which commercial insurers are willing to supply insurance. Hence, a demand-supply gap arises in insurance product delivery (Llanto *et al.*, 2007). Knowledge of the willingness to pay by smallholders like pastoralists regarding the insurance product may be useful in a policy environment because they might hint a causal links as the predictors of demand for insurance product (Cole *et al.*, 2012). A study by Rong *et al.* (2011) states that crop producers would be willing to pay more for insurance than livestock producers in China. They state that regardless of benefit interms of reducing extreme risks, farmers are price sensitive to insurance products (Rong *et al.*, 2011). Thus for a large-scale adoption of weather insurance, a subsidy for example by government or NGOs would be necessary (Chantararat *et al.*, 2009).

In the current study, hypothetical insurance product with a plain language was described to respondents to test their perception about its importance, willingness to buy, and priorities. The hypothetical product requires pastoralists to hand over one livestock every year to insure the remaining nine or 10% of the price of a livestock. It was also mentioned that the premiums will not be refunded if the drought does not occur.

Accordingly, 113 sampled pastoralists responded as yes and 11 said no on the importance of formal insurance alternative in times of drought. This figure might show that overwhelming proportion (91%) of sampled pastoralists had good perception on the relevance of insuring their livestock products for droughts. Only nine percent of them had responded as no. All of those who said no were from the pastoralists in the Somali region. This might be due to the fact that the prevalence of droughts in Afar region is so severe as compared to the Somali region. The emphasis by the Afar pastoralists on the importance of insuring their livestock can also be witnessed by the degree of their willingness to buy insurance products. To this respect, about 96% (55 out of 57) of pastoralists indicated that they were(definitely) willing to buy the insurance product for their livestock (see Table 9). Whereas in the Somali region about 86 percent (49 out of 57) of pastoralists indicated that they were(definitely) willing to buy insurance product for their livestock.

Table 9. Pastoralists' level of willingness to buy livestock insurance

Region	Livestock insurance alternative for drought			Willingness to buy formal livestock insurance certificate				Total
	Yes	No	Total	Definitely willing	Willing	Not sure	Not willing	
Somali	56	11	67	29	20	4	4	57
Afar	57	0	57	43	12	2	0	57
Total	113	11	124	72	32	6	4	114

Source: Field survey, 2014.

But the extent of pastoralists' willingness to buy drought related livestock insurance varies across livestock type (Table 10). To this respect, in both regions, cattle and goats were the first and second priority livestock types to be insured. The priority for insuring sheep was at the third place in Afar whereas in Somali region camel was at third level priority for insurance.

Table 10. Pastoralists' priority for formal insurance across livestock types

Region	Insurance priority across livestock type							Total
	Cattle	Goats	Sheep	Camel	Cattle and camel	Cattle, goat and sheep		
Somali	22	15	3	4	3	1	48	
Afar	13	12	10	3	11	3	52	
Total	35	27	13	7	14	4	100	

Source: Field survey, 2014.

It was also assessed whether pastoralists are willing to pay for insurance in kind (in livestock head). To this respect, 39 pastoralists (46 %) indicated that they are willing to pay one head of cattle to insure 10 cows; followed by (29 %) 24 pastoralists who indicated that they are willing to pay one head of goat or sheep to insure ten goats or sheep.

The existing high level of perception of pastoralists about the benefits of formal livestock insurance may mean that more pastoralists may participate in buying the livestock insurance products if it is coupled with appropriate insurance product and intensified awareness creation campaign.

#### 4.4. Challenges and Opportunities for Marketing Micro-livestock Insurance in Pastoralists

The following are the major challenges and opportunities to make livestock insurance products sustainable in pastoralist areas. As a result, products designs and marketing tools need to capitalize on the prospects and redress the challenges.

##### 4.4.1. Challenges

*i) Lack of awareness on livestock insurance:* There is very low level of awareness and knowledge about livestock drought insurance on the part of pastoralists. In line with this, it requires a comprehensive and advanced communication and marketing tool in order to create awareness among pastoralists.

*ii) Mobility:* Pastoralists often move from place to place in search of water and pasture. This adds constraints to the product designing, accessibility of pastoralists, enforcing contracts and marketing tools designed for pastoralists' awareness creation.



iii) *Strengthen legal and regulatory framework*: NBE's recent micro-insurance directive that authorize companies to market policies is yet to be tested. However, there must be incentives to insurance providers to encourage them into micro-insurance products and identifying ways of strengthening and standardizing livestock insurance products.

iv) *High risk and cost of livestock insurances products*: Most of the insurance companies in Ethiopia are reluctant to take a lead in investing agricultural insurances, including livestock insurance, which is considered to be a high risk class of insurance. Limited financial capacity of insurers and concern about their ability to access international reinsurance are some of the major problems in this regard.

v) *Limited credit access to poor pastoralists*: Since pastoralists usually have limited access to credit, it gets very difficult to sell insurances on credit base. This necessitates cash base insurance sales than on credit. However, pastoralists might not have money all the time that makes dropout rate to be higher.

vi) *Limited insurance providers in pastoralist areas*: Almost all Ethiopian insurance companies' branches are located in major cities. As a result, insurers are handicapped to closely work on the majority of rural communities in awareness creation, follow up and marketing of the product.

vii) *Trusted early warning information*: The current reliance of pastoralists on the tradition forecasters as early warning system might not go with the conditions that formal insurance might require. Thus, in addition to what pastoralists locally use the traditional forecasters, formal meteorological information might be needed to enhance their demand to formal insurance product.

#### 4.4.2. Opportunities

i) *Potential partnership with NGOs*: International NGOs that work on food security and related issues are showing keen interest in packaging the weather insurance scheme as one of the remedial measures.

ii) *Establishment of reinsurance companies domestically*: Recently both international reinsurers and domestic investors are showing interest on the establishment of Reinsurance Company in Ethiopia. This will hopefully alleviate the problem faced by local direct insurers while looking for reinsurance arrangements for placing covariant (draught) risks in the international market.

## 5. CONCLUSION AND RECOMMENDATIONS

### 5.1. Conclusion

In Afar and Somali regions of Ethiopia, there is not yet formal micro-insurance product that is sold to pastoralists and farmers. A single formal insurance company has not yet launched the service in these areas. The recent practices in the delivery of the micro-insurance product in Ethiopia are largely limited to the highland farmers; with the exception of IBLI to Borana pastoralists. However, the challenges and lessons from the micro-insurance practices to farmers and that of pastoralists (IBLI case) in other areas of Ethiopia can be applied to the pastoralists of Afar and Somali regions.

Currently the provision of micro-insurance product to pastoralists in Ethiopia is largely limited and some of the cases are also driven by NGOs such as ILRI and IFPRI. As a result, the involvement of the government and the local business community to the promotion of the micro-insurance product is minimal. In Afar and Somali regions, there are no formal micro-insurance schemes to cover any risks to the livestock losses of pastoralists due to droughts. To promote the product for a wider distribution to pastoralists so as to minimize livelihood shocks due to drought, concerted efforts need to be made by all stakeholders. Micro-insurance at current stage in Ethiopia is not viable unless subsidized. And hence, micro-insurance requires strong involvement of the government and other stakeholders such as NGOs. But

ent of the government :

before launching the micro-insurance product to pastoralists, adequate awareness mechanisms to explain the nature and the importance of the product needs to be exercised among pastoralists.

## 5.2. Recommendation

*Increased awareness creation as the first step for micro-insurance promotion among pastoralists:* Future interventions need to focus on the awareness creation of pastoralists before introducing the product. While enhancing the awareness of pastoralists on the importance of micro-insurance the role of clan leaders might also be crucial to convince the participation of pastoralists. Thus, awareness creation and promotion needs to incorporate the traditional leaders and elders.

*Provision of in kind payment rather than cash as an alternative scheme for premium payment:* Limitations in the participation of pastoralists to the micro-insurance product might be because it takes several days for pastoralists until they convert their livestock into cash. The process of taking their livestock to the market to sell for premium payment might discourage pastoralists' participation in the micro-insurance. Thus, by involving local actors such as cooperatives, there needs to be a provision where a pastoralist might pay for example one goat to insure his/her one milking cow.

*Targeting better-off pastoralists as entry approach to the micro-insurance distribution:* Pastoralists' traditional social insurance mechanisms rely heavily on better-off pastoralists insuring poorer households. However, there are no opportunities for better-off and middle wealth groups to access any form of formal insurance for their livestock assets. Providing formal insurance protecting the assets of wealthy groups is necessary to sustain existing informal insurance mechanisms. Therefore, targeting wealthy pastoralists in introducing formal insurance will have dual effect of strengthening both the formal and informal insurance mechanisms in pastoralist contexts.

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## 7. ACKNOWLEDGMENT

We are highly indebted to PRIME project and Haramaya University for their financial and material support, respectively. Degu Worku and Ahmed Ismael, who were field officers of HU-PRIME at Afar and Ethiopian Somali regions deserve special thanks for their unreserved effort in facilitating the field works and involvement in the data collection.

## INCLUSIVE FINANCIAL SERVICES IN PASTORAL AREAS OF SOUTHERN OROMIA, AFAR, AND ETHIOPIAN SOMALI REGIONS: OPPORTUNITIES, IMPLEMENTATION CHALLENGES, AND PROSPECTS

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### EXECUTIVE SUMMARY

*Providing inclusive financial services to the capable-poor is believed to be an important strategy to tackle poverty and bring about inclusive development. Access to finance opens up opportunities for pastoralists to diversify their livelihood options by facilitating restocking livestock, purchasing inputs, establishing small livestock-related microenterprises, and considering other sedentary economic activities. However, formal financial institutions mostly exclude pastoralists from their services due to pastoralists' inability to afford collateral. In addition, pastoralists' needs are unlikely to be accommodated by offering the same financial products like other groups of the community. This study was, therefore, designed to assess the inclusiveness of financial services provided by banks, microfinance institutions, and saving and credit cooperatives in pastoralist areas of southern Oromia, Ethiopian Somali, and Afar regional states. Primary data were collected from the National Bank of Ethiopia, Association of Ethiopian Microfinance Institutions, Federal Cooperative Agency, information technology (IT) service providers, head and branch offices of microfinance institutions, commercial banks, and saving and credit cooperatives, among others. Key informant interviews and focus group discussions were used to gather the data. Documents of different institutions were also reviewed to get secondary data. Qualitative data analysis technique was employed to address the objectives.*

*The research result revealed that there was encouraging development of the financial sector and a number of new financial products had been introduced. However, almost all of them were not suitable for pastoralists. It was also indicated that the introduction of mobile banking and interest free banking services were found to be promising products in addressing the marginalized section of the community. Some commercial banks started operating in pastoral areas, even though their focus was on either to mobilize deposit or hunt foreign currency. Even MFIs tend to primarily serve urban unemployed youth and less accessible for pastoralists in most of the cases. Both the performances of MFIs and RUSSACCOs were not satisfactory in terms of their penetration rate. The study also revealed that financial illiteracy, pastoralists' mobility, tribal conflicts, and limited financial capacity were some of the constraints hindering financial inclusion. Whereas, interest of financial institution to operate in rural areas (at least via their agent and outlets), the start of mobile and interest free banking services, and the start of sedentary way of life are some of the opportunities available for institutions promoting financial inclusion. This study recommends stakeholder to*

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*cooperate in improving financial literacy, support institutions operating in rural areas, expand infrastructure, and design more innovative financial products to address the needs of pastoralists.*

## 1. INTRODUCTION

Access to finance has been recognized among policy makers as a magic bullet of development. There is ample evidence that enhancing access to financial services for the capable-poor is an important strategy to tackle poverty and bring about inclusive development (UNDESA and UNCDF, 2006). This means, inclusive financial service is an engine to make the development of a nation inclusive. Inclusive finance is broadly defined as access to a range of quality financial services such as credit, savings, insurance and payment systems and remittances to the excluded (people with low income and limited property collateral in Ethiopia) from the mainstream financial system through diverse providers (Stein *et al.*, 2011). Quality financial services here refers to affordability (costs such as the existing features of the product), convenience (proximity, loan processing time, etc) and provided with dignity to the clients (customer care, consumer protection, etc). It should be noted that financial inclusion does not only mean counting the number of people who access financial services but also accessing quality financial services.

Though the emergence of microfinance has dramatically increased financial accessibility to the poor, there are still large sections of societies that cannot be effectively served. Pastoralists, who constitute significant portion of the sub-Saharan African community, are among the least financially served part of the society. In Ethiopia, the pastoral community covers about 12% of the population and 63% of the land mass (FDRE-MoA, 2013), and plays significant role in the socioeconomic dynamics of the country. Pastoralists need credit for different purpose such as restocking livestock, purchasing inputs and establishment of small livestock-related microenterprises. Nevertheless, not only formal banks but also micro-financial institutions tend to avoid lending to vulnerable poor such as pastoralists (Amin *et al.*, 2003). Such limited financial service obstructs the development of private sector and commercialization of the sector. As a result, livestock and non-livestock livelihood and entrepreneurial opportunities among the pastoral community remains largely underutilized. Hence, the sector generally remains underdeveloped and vulnerable to environmental and socio-economic shocks.

Lack of financial services in pastoral areas can be attributed to various reasons. Literatures iterated that the major factors that hinder the provision of financial services to the pastoral economy are a high level of transaction cost due to lack of infrastructure, mobile and fragmented herder community and small loans. Pastoralists are also excluded from formal banking services since they do not possess the assets by which they can meet the collateral requirements of formal banks (Zeller *et al.*, 1997). Moreover, pastoral communities in the study area (or PRIME project intervention areas) are Muslims and tend to avoid interest bearing and collateral based-financial products due to prohibition by *Sharia* law. Moreover, when it comes to the marginalized groups of society (such as women, the disabled people, etc.), the financial service's responsiveness is minimal by any standard. Hence, inclusive and innovative financial products that take the economic conditions and lifestyles of the pastoral communities into account and comply with their ethical and religious values are critically needed to improve their livelihood.

The empirical evidences regarding the financial inclusion in Ethiopia particularly in pastoral areas are scant. Recently, there are a number of new developments in the Ethiopian financial industry including the introduction of interest free banking, mobile banking, and agent banking. Cognizant to these developments, this study was initiated to address the issue at macro, meso and micro levels. As far as our

knowledge is concerned, there is no any study conducted to evaluate the financial inclusion by taking into account these emerging phenomena in the study areas. Therefore, this study was believed to bridge this research gap via incorporation of the new developments in the financial sector. The study also aimed at examining whether or not the financial products offered by banks, microfinance institutions, and saving and credit cooperatives operating in pastoral and agro-pastoral areas of the selected regions were inclusive. More specifically, the study had the following specific objectives.

- ◆ Assessing the outreach and accessibility of financial services to pastoralists in Afar, Ethiopian Somali and Oromia regional states of Ethiopia;
- ◆ Identifying current and potential innovative and inclusive financial products which are suitable to the situations of pastoralists; and
- ◆ Identifying the challenges and opportunities to provide inclusive financial services in pastoral and agro-pastoral areas.

## **2. METHODOLOGY**

### **2.1. Sampling Techniques**

The research was conducted in pastoral areas of Southern Oromia (Southern Cluster), Afar (Afar Cluster), and Ethiopian Somali (Eastern Cluster). These areas were purposively selected because the PRIME project (a primary consumer of this study) operates in these areas. In addition to this, the sites were supposed to represent the pastoral and agro-pastoral areas of the country. All formal financial institutions (Banks, insurances and microfinance institutions) widely operating in the study area were included while branches of these institutions as well as saving and credit cooperatives operating in the areas were purposively selected based on their proximity to the pastoral community in many dimensions, years of operation, and location. Two information technology (IT) services providers (BelCash and M-birr) were purposively selected as meso level actors of the financial industry because they were well-established companies which sell IT to most of the financial institutions.

### **2.2. Methods of Data Collection**

Data were collected in September and October, 2014 from macro, meso, and micro level actors of the financial market. Semi-structured interview schedule, key informant interview and focus group discussion checklists were designed to collect primary data from the selected sources. The data collection was started at macro level by conducting key informant interviews with experts of National Bank of Ethiopia (NBE) about the whole picture of the money market. In NBE, the three supervision team leaders (banks, micro finance institutions, and insurances) were interviewed. As meso level stakeholders of the market, the key informant interviews were also conducted with managers of the Association of Ethiopian Microfinance Institutions, and two IT service providers (BelCash and M-Birr) for financial intermediaries.

Finally, micro level data were gathered from two head offices and seven branches of microfinance institutions, three head offices and 29 branches of commercial banks, four head offices and five branch level offices of insurance companies, officials of 12 zone and district level cooperative promotion agencies (offices), three Woreda and Zone administrations, and eight rural saving and credit cooperatives (RuSACCOs). Personal interviews were conducted to collect data from the officials (managers, heads, and/or experts) in all of these institutions. Focus group discussion was used to generate data from leaders and members of RuSACCOs. In order to triangulate the data collected from primary sources, relevant

documents of the aforementioned secondary sources were also collected and reviewed. These data were organized and analyzed qualitatively.

### 3. RESULTS AND DISCUSSIONS

#### 3.1. Banks Service and their Inclusiveness

##### 3.1.1. Banks outreach/distribution

The existence of financial institutions and their geographical distribution can be considered as a prerequisite for financial inclusion. Commercial banks are believed to be pioneer in introducing modern financial services in the Ethiopia. Evidences from the National Bank of Ethiopia shows that currently there are 19 commercial banks operating in all regional states of the country, of which 16 of them are privately owned (NBE, 2014). Most of the private banks were established in the last 10 years and encouraging growth was registered in the Ethiopian banking industry.

When we see the number of branches as measure of outreach, the total number of branches of all banks was, to the time of data collection, counted to be 2275 and it keeps growing continuously. Despite the fast growing number of the branches, their geographical distribution was uneven because most of them are concentrated in urban areas. About 34.42% of the branches were located in Addis Ababa while other less developed and pastoral regions had negligible shares (see table 1)

There are some private and government owned banks operating in the study areas. However, they were not adequate in number and most of them were new for the areas and their economic activity as well. Afar cluster was found to have the least number of commercial banks. This coupled with the inexistence of well-function MFIs in the region left the pastoralists in the area financially underserved. In Eastern cluster (Ethiopian Somali Regional State), most of the banks opened their branches but limited to Jigjiga and Togo-Wuchale towns, which have a very limited access for pastoralists.

Table 1. Branch Net-Work for Ethiopian banking sector, By Region.

Name of bank	Region											Total	Bank's share
	Gambela	Beni-shangul	Hareric	Afar	Somali	Dire Dawa	Tigray	Southern NN	Amhara	AA	Oromia		
<b>Public banks</b>													
Commercial Bank of Ethiopia	4	8	5	13	20	8	72	137	154	159	291	871	38.29
Development Bank of Ethiopia			1			1	2	7	5	1	15	32	1.41
Construction & Business Bank	1	2	1	1	3	2	7	11	17	47	23	115	5.05
<b>Sub Total</b>	<b>5</b>	<b>10</b>	<b>7</b>	<b>14</b>	<b>23</b>	<b>11</b>	<b>81</b>	<b>155</b>	<b>176</b>	<b>207</b>	<b>329</b>	<b>1018</b>	<b>44.75</b>
<b>Private banks</b>													
Awash International Bank	1	1	1	1	3	3	5	6	5	91	39	156	6.86
Dashen Bank	1		2		1	2	8	13	16	76	26	145	6.37
Bank of Abyssinia		1	1		2	1	6	8	22	54	16	111	4.88
Wegagen Bank		1			2	3	17	7	9	49	11	100	4.4
United Bank	1	1	1	1	2	1	6	7	12	56	12	100	4.4
Nib International Bank			1		3	1	3	13	5	55	12	94	4.13
Cooperative Bank of Oromia			1		2	3	2	4	5	26	72	114	5.01
Lion International Bank			2	3	2	1	22	4	3	31	3	69	3.03
Oromia International Bank		1			2	1	3	3	3	34	70	118	5.19
Zemen Bank						1		1		6	3	11	0.48
Bunna International Bank	1	1	1		3	1	5	6	14	24	12	68	2.99
Berhan International Bank						1	3	6	5	29	9	53	2.33
Abay Bank		1	1	1	2	1	6	2	39	16	3	71	3.12
Addis International							1	1	1	16	2	21	0.92
Dehub Global Bank S								10		7	2	19	0.84
Enat Bank S.C							1	1		6		8	0.35
<b>Sub Total</b>	<b>4</b>	<b>7</b>	<b>10</b>	<b>6</b>	<b>24</b>	<b>20</b>	<b>87</b>	<b>92</b>	<b>139</b>	<b>576</b>	<b>292</b>	<b>1257</b>	<b>55.25</b>
<b>Grand Total</b>	<b>9</b>	<b>17</b>	<b>17</b>	<b>20</b>	<b>47</b>	<b>31</b>	<b>168</b>	<b>247</b>	<b>315</b>	<b>783</b>	<b>621</b>	<b>2275</b>	<b>100</b>
<b>Regions' share</b>	<b>0.4</b>	<b>0.75</b>	<b>0.75</b>	<b>0.88</b>	<b>2.07</b>	<b>1.36</b>	<b>7.38</b>	<b>10.86</b>	<b>13.85</b>	<b>34.42</b>	<b>27.3</b>	<b>100</b>	

Source: NBE (August, 2014).



### **3.1.2. Recent development of Ethiopian financial system and their relevance for pastoralists**

#### **A. Mobile, agent, and internet banking**

Mobile banking and internet banking services are among the recent developments in Ethiopia financial system. Ethiopia was among the last to start mobile banking service in Africa. Limited access to telecom technology and financial security were among the reasons for this delay, though the technology is believed to play a critical role to increase financial access and facilitate transactions. For the last four years, some technology providers of mobile banking, notably BelCash and M-Birr, have developed the service by anticipating that the start of mobile banking is inevitable. In 2012, the National Bank of Ethiopia came-up with a directive (Directives No. FIS/01/2012) that allowed commercial banks and microfinance institutions to provide mobile and agent banking services. However, banks were reluctant to start the services as soon as it was allowed. Rather, the technology providers had to do a lot of awareness creation in order for banks to use the mobile banking technology.

Currently, few banks already started mobile and internet banking services in Ethiopia while some others ordered the technology to implement it soon. The service was also introduced at branch levels of these banks in the study area and people started using it. However, in southern cluster specifically Moyale area (Ethio-Kenya boarder), it was reported that some people were afraid to use mobile banking as they knew the bad experience of Kenyan IT-Led mobile banking provider, M-Pesa. Sometimes, Kenyan mobile bank users blamed that their accounts were cracked by cyber warrier (thieves) and got their balances transferred to some other accounts. This created hesitation on Ethiopian mobile banking users.

Mobile banking is being used to make local money transfer and payments and believed to increase access and efficiency. Definitely, the system opens up opportunities not only to develop the new financial products but also to significantly reduce the transaction costs of providing the service to scattered pastoralists. Despite the large number of mobile subscribers (about 40 million at this time), people argue the high illiteracy rate may make the mobile banking less effective. However, technology providers, for instance BelCash, have devised solutions for this by designing multiple options to use the service including Short Message Service (SMS). Network problem, low awareness of actors about the business, and high illiteracy rate were identified as reasons that limit the development of mobile banking in Ethiopia in general and in the study area in particular. The research also revealed that NBE's requirement that the technology provider should deliver the system to the user (financial institutions) after three years period of trial created disincentive for technology providers.

There is a possibility that pastoralist in rural area may benefit from this technology if agents start functioning well. When agents of the financial institutions that operates in rural remote areas where most pastoralists reside, there is an opportunity of accessing financial services like saving, withdrawal, and money transfer in their locality. This a step forward to bring about financial inclusion.

#### **B. Interest-free banking**

Interest free banking service refers to banking business in which mobilization of funds is undertaken in a manner consistent with Islamic finance principles and mode of operation that avoids receiving or paying interest (NBE, 2011). There has been a strong public demand of this bank service particularly from Muslim community and it has been an important factor to bring such people in to the banking industry. The National Bank of Ethiopia responded for this public demand by authorizing banks, by its directive number SBB/51/2011, to serve interest-free banking in a separate window of their existing branches as of

October, 2011. However, individual banks should provide their independent request and get approval from NBE to start the service. To date of data collection, about three banks, namely Commercial Bank of Ethiopia (CBE), Oromia International Bank (OIB), and United Bank were allowed to give interest free banking services while some others were on pipeline to get approval to start the service. These banks started the interest free banking service in their branches where Muslim communities are large in number such as Oromia, Ethiopian Somali, and Dire Dawa. As far as the study area is concerned, almost all branches of these banks started interest free banking service. Saving and financing are the two most important interest-free banking services being introduced by these banks. Different types of interest free financial products are presented in section 3.2.2 of this paper.

In practice, most of the branches which offer interest free banking service focus on interest free deposit mobilization, but financing was found to be operational only in few branches. The time lag needed to get adequate deposit was raised as a reason for delay of financing, since deposits collected through this modality should be the only source of finance. Poor quality and less convincing feasibility studies that were provided by customers were also considered as another reason of rejecting financing requests.

There are some banks that deliberately confuse interest free banking with non-interest bearing account. They act as if they are allowed and served by interest free banking service if they have non-interest bearing deposit that is legally possible for everyone. In some area where Muslim communities are large in number like Ethiopian Somali (Eastern cluster), significant number of depositors have had non-interest bearing account even before the start of interest free banking service.

Practitioners of this new banking service agree that there is a good demand for most of the financial products offered under interest free banking. Even in the areas where the service is not yet launched, people are requesting the nearby commercial banks to start the service. Promoting the service with local elders or religious leaders in mosques was found to be effective means to attract people.

It was reported in this survey that one of the major challenges repeatedly raised by banks is the existence of double taxation in *Murabaha* financing service. Accordingly, the bank purchase items, add some transaction costs on its original price, and transfer the item to the customer on credit basis. In this transaction, the bank pays VAT when it purchases and then another VAT is issued when the bank transfers the item to the customer. This double taxation makes the item unjustifiably expensive and makes the business practically infeasible. This again makes the sustainability of the financial product questionable unless corrective measure is taken by the monetary and fiscal authorities.

The inability of banks to have dedicated branch for interest free banking and thus serving in a separate window of the same room made users have a wrong perception that their money might be mixed with the interest bearing one. However, banks were allowed to have separate outlets to exclusively give this service though staffs seated for this were usually observed idle waiting for such new and in some areas rare customers.

The study also identified the following additional challenges of interest free banking service.

- ◆ There were some customers who believed that the system, especially the financing one, still involves interest rate in the name of profit sharing.
- ◆ Shortage of knowledgeable staff in the area and almost all actors lack awareness about the system
- ◆ Dispute resolution system (legal procedure) regarding interest free banking is new for judges. This may call for new laws and juries to accommodate the new interest free banking system.

Generally, the existence of the interest free banking service was found to play a crucial role in satisfying the financial needs of Muslim community. This is particularly true in the PRIME operation area where majority of the pastoralists are Muslims. The compliance of the service with Islamic law is a good initiative to bring marginalized pastoralists in the banking industry though there are other issues that need to be address to fully utilize this opportunity.

### *3.1.3. New financial products of conventional banking and their inclusiveness*

There are a number of new financial products developed by different commercial banks in the last few years. The rise in competition among banks, which is associated with increased number of banks entered into the market, as well as the people's demand for new services positively contributed for financial innovation. Most of these new products are saving products which are emanated from the banks need to encourage saving and mobilized more deposit. These saving products are created simply by disaggregating savers on the basis of their age, sex, and profession. Youth's account, children's account, women's account, solution account (for students), traders' saving account, and marriage saving account are some of new saving products developed recently. In addition to the new loan related products of interest free banking discussed earlier, we found only few innovative loan products in the conventional banking system. Over-drawal is an example of new loan product introduced by Buna International Bank. This is an arrangement that a customer withdraw on current account, regardless of his/her balance, without having a loan deal with the bank. The bank gives loan by surrendering the clients' check. It involves term loan and use of overdraft in combination.

All these new financial products are being offered in branches of commercial banks which are located in the study area. However, none of them targeted marginalized pastoralists. Almost all of the above products are in line with the needs of the rich as well as urbanites. The pastoralists' needs are unlikely to be accommodated via provision of the same product with the other groups of the society. The survey could prove that there is only one bank (Oromia International Bank) under preparation to introduce a new saving product called "Farmers' Account" and this product is believed to come up with the innovative ways of addressing the pastoralists' needs. Generally, the previous innovations are not as innovative as the available financial demand by pastoral communities.

### *3.1.4. Deposit mobilization efforts of banks*

Deposit mobilization is found to be a primary focus of most banks especially in Afar and Southern cluster. This effort has targeted different section of the society including rural dwellers and petty traders. In order to reach the rural areas, most banks use van banking and remote outlets which is closer to the society. The effort of saving mobilization using van banking is much common in southern cluster. Officers from those banks travel to rural areas like market places, public areas, *Kebele* meeting and water points to create awareness and mobilize deposit. They manage to open significant numbers (about 100) of accounts per day.

However, this banking practice has a lot of challenges. Since going in remote villages compromises the operation of the branch, most of them do such mobilization activity very infrequently. In some areas, practicing van banking is impossible for security reasons unless the local administrators or security forces cooperate with them. In order to be effective in the deposit mobilization campaign in pastoralist areas, having a locally born and known staff is a must to get pastoralists' trust. Here, what matters is individual, not institution or the system.

In urban areas the strategy is different including door to door services and offering people, who come to the bank for other purposes, to open an account. The most common phenomenon in urban areas is that people who are coming to the bank to deposit small amount of money consider it as both infeasible and disgracing. In order to break this problem and to include small savers, some banks (notably Commercial Bank of Ethiopia) has come up with a mechanism called *Muday* bank (sometimes called Peggy box or coin box) system. Accordingly, a small box is given to account holders to be able to deposit money into it and banks will collect it periodically and update their account.

It is usually difficult for banks to get more savers in urban centers of Kenya and Somaliland borders as most of the people are engaged in trading activities (mostly contraband) and they do not have idle cash to deposit. This deposit mobilization effort is relatively weak in Ethiopian Somali regional State (particularly Jigjiga and Togo-Wuchale) since the primary focus of banks is to earn hard currency.

Generally, van banking, opening outlets, and introduction of *Muday* bank were found to be important developments to increase access to financial services for pastoralists and reduce transaction costs of financial institutions. In addition, the following strategies were found to be useful to mobilize saving or reach the community and increase financial accessibility, if banks can use the following media in efficient way.

- ◆ the administration organ to take banks assignment
- ◆ religious institutions and religious leaders
- ◆ associations
- ◆ Automated Teller Machine (ATM)
- ◆ Influential customers
- ◆ local elders
- ◆ Service excellence
- ◆ Promotional activities

### 3.1.5. Loan provision by banks

Financing is one of the major activities of banks in any economy. Access to loan is considered as an important means of financial strategy for both business organization for their business start up and expansion, and households for consumption smoothening. However, there are a number of barriers that hinder borrowers from access to loan. One of the major barriers is banks' eligibility criteria for loan.

In this study, the eligibility criteria of banks in the study area were assessed. The common requirements include being a business owner, trade license, tin number, tax related clearance from Revenue and Custom Authority, project feasibility study, and collateral its value is more than 100% of the requested loan amount. Similarly, hotel, construction, commercial agriculture, international trade (usually livestock and Khat), and domestic trade are among the sectors eligible to be financed by banks. The types of assets accepted as collateral by banks are insured buildings, vehicle, merchandise, sales contract, shares, bonds, treasury bill, and fixed deposit, to name the common ones. But, building is the first choice for banks to take as collateral.

Not only these eligibility requirements but also the supply of loan negatively affects access. For instance, Commercial Bank of Ethiopia currently has very limited loanable fund to the private sector since it is required to finance the giant public projects.

The private banks are highly risk averse. Most of them require more than 100 per cent collateral and very careful in screening process. As a result, default is less common these days. The banks' predefined

target or main mission when opening a branch in an area also affects their loan decision. For instance, in a very small town of Togo-Wuchale (Eastern cluster), where about 12 branches of banks are located, there is only one individual who succeeded to get loan from Construction and Business Bank (CBB) in the history of the town. The very reason of this is that the primary purpose of branches in that area is neither to mobilize saving nor to provide loan, rather getting foreign currency.

Critical evaluation of the inclusiveness of the banks' loan showed that it undoubtedly marginalizes poor people and pastoralists. Because the eligibility requirements, the type of collateral required and business sector that banks prefer to their finances are not consistent with the economic condition. Even the recent development of the micro insurance products, particularly Index Based Livestock Insurance (IBLI), does not provide an audacity to banks to use livestock as collateral.

Institutional guarantee is considered as a means to bypass the collateral hurdles to make banks' loan accessible for such marginalized people. In some areas, there has been a practice that either the local administration organ or interested NGOs become guarantor to get the loan. However, it is only few banks which have had such experiences and willing to accept it at branch level while others were new for this and they should get approval from their respective head offices.

### **3.1.6. Social characters/ life of the pastoralists and their implications**

Pastoralists do not need to deposit money in banks if they have secured box/drawer (*Kazna*). For instance, in Ethiopian Somali Regional State, pastoralists put their money in big shops called *Bukar* which operates in rural areas. These shop owners work with the depositors' money. They get such deposits just because they own drawer/box/cabinet. Then, when need arises, depositors take their money back without interest or take some items from the shop in place (shop owner repays in kind).

The other unique feature of the area is individualistic life is minimal and most of the resources are communal. Accordingly, wealthy individuals in the tribe have a mandate to share resources for their poor tribe members. As a result, some people get easy money from few hard workers and tend to avoid working lower level jobs since only jobless members are subject to the gift. This discourages saving. Most rich members are asked to give money at the bank gate when they withdraw or deposit their money from/to the bank. These discourage bank users to come to the bank for any services. As an escaping mechanism, banks were found to give outdoor services for these people. Sometimes the people themselves call the bank manager and send another individual to do the bank transaction on their behalf. This again retards the effort of bringing pastoralist to the banking sector.

### **3.1.7. Opportunities and challenges in provision of inclusive financial service by banks**

#### **A. Opportunities**

The following opportunities are available for robust market development for inclusive financial service in the study areas.

- ◆ The start of the interest free banking system;
- ◆ The transition of pastoralist community into agro pastoralist;
- ◆ Unutilized market with huge potential;
- ◆ Export oriented market developments;
- ◆ Technological expansion including mobile usage;
- ◆ The small savers' deposit is stable once obtained;

- ◆ Cooperation of local administrators and NGOs;
- ◆ Easy to mobilize the community, using local elders, to bring the pastoralist to the bank industry;
- ◆ The decline of contraband practices over time; and
- ◆ The start of livestock insurance.

### ***B. Challenges***

In addition to the aforementioned opportunities, the area has a lot of challenges that hinder the development of the sector unless certain intervention is made. The challenges are listed hereunder.

- ◆ Unfair competition: The NBE system could not control the banks operating illegally (like buying foreign currencies beyond the official rate) or informally. Exclusion of the private banks from running government accounts and related transactions is the other source of unfairness.
- ◆ The rule of 27% bond purchase makes loan advancement unattractive.
- ◆ Infrastructure and logistic problem (road, network, vehicle transport, etc)
- ◆ Low level of awareness and low saving culture.
- ◆ Living style of the pastoralists/ high mobility.
- ◆ High conflict related risks.
- ◆ No coordination or synergy among different sector.
- ◆ Contraband trade- unstable and illegal business activity.
- ◆ Less business know-how.
- ◆ Pastoralists are unable to trust banks especially private ones to deposit money.
- ◆ Sales of livestock on credit basis to traders which leads to low loan demand by traders who usually default and leaves pastoralists with less capacity to save (southern cluster).

## **3.2. Microfinance as Source of Finance for Pastoralist: Performance and Out Reach**

Microfinance has evolved as an approach for poverty alleviation and a development path way through provision of financial service for marginalized group of a society. It has been realized and has taken the attention of policy makers, academics, donors and practitioner after the success story of Grameen Bank in Bangladesh.

In this paper, two microfinance institutes, namely, Oromia Credit and Saving Share Company (OCSSC) and Somali Microfinance Institute, which operate in the study area, have been investigated. The former renders customary microfinance services due to the reason that its operational area is characterized by diversified religious and cultural composition. On the other hand, the later inclined on interest free financial services since it operates in the area where Muslims communities are very large in number. The services rendered by these two MFIs are studied and separately presented as follows.

### ***3.2.1. Oromia Credit and Saving Share Company and its financial services in the southern cluster***

OCSSC with its 300 branches has reached 809,284 clients. In terms of loan disbursement and saving mobilization, the share company has registered considerable growth. In numerical value, a change of loan disbursement from 9,049,388 Birr in 1997/98 fiscal year to 3,545,909,695 Birr in 2013/14 fiscal year and saving mobilization from 1,200,317 Birr in 1997/98 fiscal year to 2,212,529,239.45 Birr 2013/14 clearly reveal the change (OCSSC, 2014). OCSSC has provided the under explained three major financial products to its customers in the study area.

### A. Loan

- a) **Micro and Small Scale Enterprise Loan:** as the name indicates, this loan product is provided to micro and small scale enterprises which operate in the areas/*Woredas* on the basis of guarantee from the *Woreda* administration. To get this service, any enterprise should satisfy the requirements like: all members should be the dwellers of that *Woreda*, 20 percent of the total loan request should be saved by the client in advance, it should be licensed or legally recognized business, business plan and most importantly the letter of guarantee from the *Woreda* administration. Some branches, like Moyale *Woreda*, have additional criterion that confirm all members are unemployed. This product is widely applied in all branches of the institute located in southern cluster.
- b) **Group Based Loan:** this product is delivered for those who come to the company after forming a group with a letter of confirmation about their residency in that *Kebele* from the *Kebele* or *Woreda* administration. All members are indebted for the default of any group member. Like micro and small scale enterprise loan, this product is also operational in all the branches of the institute.
- c) **General Purpose Loan:** this scheme is provided for permanent government employee with a guarantee of their salary. The client should bring supportive letter from his/her employer. This product is not functional in all branches considered in the study.

### B. Saving

- a) **Regular saving:** this regular saving is made by individuals who have got a loan from the company despite the fact that it is open for anyone interested to save his/her money.
- b) **Handhura/minor saving:** voluntary saving or deposited for new born baby with very lucrative interest rate. In all branches in the site, this product is at its stage of promotion and no account was opened so far but it has a good indication that clients have interest for the product.
- c) **Sorema/Pension saving:** saving puts during young age by the client and that will be withdrawn by a person during his period of retirement. However, it is not practical in all branches considered and the effort of promoting the product seems fruitless.
- d) **Coin-box saving:** Like banks, this institute also uses coin box saving product which has been found very effective saving promotion technique for petty traders.

### C. Insurance sales

The company also involves in selling of Index Based Livestock Insurance (IBLI) policies on behalf of Oromia Insurance Company. In this regard, branches in this assessment site are involved in promoting the product and some of them are actively engaged in selling. Moyale *Woreda* branch of the company had sold eight policies so far with the commission rate of 10 percent and educate the society about the advantage of sharing their drought related risks with financial institute. The branch has better performance as compared to others as far as this issue is concerned.

Despite the fact that great effort was made to reach the pastoralist by the company, its performance to reach them was very unsatisfactory as compared to the financial injection that was needed for them to take out of their current living condition. The company had 27 branches in the two *Woredas* of PRIME intervention area and reached 53,660 clients as it is tabulated hereunder in Table 2.

Table 2. Branch Distribution of OCSSC in PRIME Intervention Area

Zone	Numbers of Branches	Number of Client		Loan Disbursement	
		Urban	Rural	Urban	Rural
Borena	13	2,999	13,562	26,194,300	65,405,900
Guji	14	4,537	32,562	34,686,100	144,985,100
Total	27	7,536	46,124	60,880,400	210,391,000

Source: Own computation from raw data from OCSSC, 2014.

In Borena zone, those who got access to microfinance service consisted 3.1% of population above the age of 14, which is 531,757 according to CSA (2008) where as in Guji zone, the figure is 6.9%. It clearly indicates that the penetration performance of the company is very low.

Equivalent weakness was observed in terms of area coverage. For instance, Yabello branch's area coverage clearly demonstrated that only five out of 34 Peasant Associations of the *Woredas* got its service

Loan repayment records of branches in the site showed that delay of repayment and default were common phenomenon that put branches into trouble to satisfy the large demand. This problem was particularly true for its urban clients. The major reasons for these default and delay record of urban clients were that they received a loan without prior business skill training and they didn't have a commitment. However, this was not a problem for rural client because they had strong commitment for their work and the firmly adhere to the religious and traditional values and rules to repay the loan on time, even before the due date. Though the target of loan repayment for microfinance institution was 97 % of the total, the actual performance of Negelle Borena branch, for instance, was as low as 20%.

### 3.2.2. Somali Microfinance Institution and its financial services in the Eastern cluster

The other microfinance that operates in PRIME intervention area is Somali Microfinance Institute. The Institutions through its head office and branches provides both conventional and interest free microfinance services. It has 16 branches and tries to have at least one branch in eight zones of the regional state and one zones still out side of the range of any branch. The available financial products of the institute which are customary to its client in the surrounding area are:

- a) **Murabaha (Increase in capital or profit trading):** it is a sale wherein the mark up, 13% in our case, is disclosed to the buyer. It can be done on the basis of spot payment as well as credit sale. Murabaha contract has two forms which are ordinary Murabaha and Murabahato the purchase order. This one is fully functional and widely used as compared to others.
- b) **Mudarabah (profit and loss sharing contract):** The financial institutions pools investors' money and assume a share of the profits and losses. This is agreed upon with the depositors. A group of mutual funds screened for Sharia compliance has arisen. They share the profit in the case of its gain based on the agreed percentage. In the case of loss it should be attributed to the *rab-al-mal*, except in the case of negligence from the *mudarib* (lender) since the *mudarib* loss his effort. This financial product is rarely provided to the clients of the institution. In addition, to what has been described above the institution has the following financial products in its plan but not implemented yet.



- c) **Musharakah (Partnership and Joint Stock Ownership):** is a partnership based business contract wherein the business partners share the profits as well as losses. Profits are shared according to the pre-agreed profit sharing ratio, while the losses are shared as per the capital contribution of each partner.
- d) **Ijarah (Leasing):** The sale of the right to use an object (usufruct) for a specific time period. One condition is that the leaser must own the leased object for the duration of the lease. A variation on the lease, 'ijarahwa 'iqatina provides for a lease to be written whereby the leaser agrees to sell the leased object at the lease's end at a predetermined residual value.
- e) **Salam (Islamic forward):** The price for the item is prepaid and the item is delivered at a definite point in the future.
- f) **Istisna:** is a forward sale contract wherein the commodity is sold to the buyer before it comes into existence. In other words, Istisna is a contract in which the buyer orders a manufacturer to manufacture certain commodity.

The institute is also determined to adopt innovative financial products. The very convenient saving product called coin box saving has been started and it has 350 active client. It is also highly involved in local transfer from one *Woreda* branch to the other. In addition, the institute is on the way to start agent banking in collaboration with Belcash.

Though the entire financial products are operational, head office and branch level transaction revealed that Murabaha is the dominant product. Any group come up to get this loan should satisfy the criteria set by the institute, which are:(S)he should be dwellers of the *Woreda* where application is made, unemployed, free from any addiction, not be contrabandist, within the age range of 18 and 60, and spouses should agree with the contract. If the requirement is fulfilled, the individual becomes eligible to get any Islamic financial services which are provided by the institute.

Despite the fact that these convenient products are available, majority of the pastoralists couldn't get its financial services due to internal and external factors of the institute. So far around 7,000 clients get the service, which is very much insignificant as compared to the immense demand for the product. In terms of area coverage, most of the pastoralists are outside the range of branch distribution of the microfinance. Out of its 16 branches, 12branches were close to pastoralists and the remains were located close to towns where other economic activities were the same as other areas of the country.

In terms of default rate, this microfinance has an outstanding performance as compared to the former. So far no default is recorderd at head office level. In addition the institute is committed to reach rural women by setting a target of 90 percent of its outstanding loan should be for them. It is due to the fact that they are marginalized due to cultural biases that they have passed through.

Areas of Afar Regional State, which is covered by this assessment, did not get any microfinance service services to date of the data collection. However, very recently we could learn that Afar micro finance has been established with the support of PRIME project to render financial service in the region. This development is believed to play its own role to tackle financial deprivation in the area.

### **Challenges and opportunities of MFI**

#### **A. Opportunities**

As per stakeholders information together with direct observation of the environment the following opportunities are identified to improve access to microfinance services and to make the service robust.

- ◆ The existence of huge unmet financial demand that creates market opportunity for MFIs;
- ◆ NGOs are willing to provide support to enhance the financial access for the pastoralists;
- ◆ Encouraging capacity of institution to render interest free microfinance services;
- ◆ No default experiences of rural beneficiaries due to positive cultural values which encourages service providers to operate in such community;
- ◆ The willingness of both local and regional governments to collaborate with actors;
- ◆ The inspiring profitability of the sector;

### ***B. Challenges***

On the contrary, the sector faces the following challenges that hinder it from achieving its goal of reaching the marginalized pastoralist:

- ◆ Financial illiteracy of the society;
- ◆ Mobility of the society is frequently referred as one reason for denial of loan service;
- ◆ Frequent occurrence of conflicts in regional border areas hinder the institution from expansion to that area;
- ◆ Border area dwellers have dual identification cards from both Ethiopia and Somaliland that may create a problem to clearly define the target, which is particular to Somali Microfinance Institution at Togo-Wuchale branch;
- ◆ Limited capacity of MFIs in terms of human resource and finance;
- ◆ Donation type intervention practices create a dependency syndrome in the minds of the society and make them phobic for loan; and
- ◆ Infrastructural problem to reach very peripheral areas of pastoralists;

## **3.3. Rural Saving and Credit Cooperatives (RuSACCOs) in Pastoral Area**

### ***3.3.1. Historical development***

Despite the fact that Ethiopians have a long history of working together in cooperative- like institutions, or “cultural co-operatives” *Edir, Ekube, Debo/Wonfel, Mahiber/Senbete, and Cheffee Kore* to name only a few, which were the basis of modern cooperatives in general, and saving and credit cooperative in particular, the country is still in infant stage of cooperative development. The concept of modern cooperatives in the developed world has a long and a success story. According to Meniga (2014), the modern saving and credit cooperative has been introduced in Ethiopia after 110 years it has been started in Germany when employees of Ethiopian Roads Authority established the first SACCOs in 1957. The development of the sector was not satisfactory for long period of time.

Recently a regulatory framework was put in place to license and supervise cooperatives, which are proclamation No. 147/98 and its amendment Proclamation No 402/2004 (Federal Negarit Gazeta, 1998; 2004), have created conducive environment for the development of cooperatives in general and financial cooperatives in particular. Evidences from the Federal Cooperative Agency shows that there are 14,453 financial cooperatives in the country. Pastoralist Community Development Project (PCDP) has great contribution for the development of the sector through injection of large sum of outlay as seed money. This largely contributes the development of cooperative in pastoral area of Ethiopia in general, and the study area in particular.

### 3.3.2. Performance and Outreach of RuSACCOs

Due to the very reason that conventional banks' and microfinance's' service are inaccessible for the majority of pastoralist, RuSACCOs are the option to bridge this gap. However, the qualitative data from SACCOs in Afar regional state and Ethiopian Somali Regional State and both qualitative and quantitative information from RuSACCOs and cooperative promotion offices in southern Oromia reveal that the actual performance of RuSACCOs in pastoral area is unsatisfactory. The quantitative manipulation from Table 3 confirms their low performance.

Population data from the CSA (2008) and members' data from the Oromia Cooperatives Promotion Agency have been utilized to calculate the penetration rate of saving and credit cooperatives in the southern Oromia region. Accordingly, it is only 4.87% of the eligible population have access to this inclusive financial service.

The two zones in PRIME intervention area are not exception in this regard with the penetration rate of 3.9% and 1.07% for Borena and Guji zones, respectively. The performance of Borena zone is slightly less than the region average whereas the Guji zone is worse than the regional average. However, from the personal observation the later zone's cooperative promotion office is aggressively going to establish new RuSACCOs and strengthening the existing weak ones. This is a contradiction from the same analysis for microfinance outreach for Borena and Guji zones that calls for new research to check whether the non-existence MFIs has forced the society to form and develop SACCOs or not.

Lot of factors attribute for this low performance. Based on the data from RuSACCOs representatives in the area and cooperative promotion office experts, RuSACCOs are operated and managed by elected committee members. Most committee members are illiterate. Even those who attend elementary school or high school lack the capacity to operate and manage efficiently. They lack basic knowledge and skill to perform the day- to day activities of SACCOs. Hence, it is difficult to expect an efficient performance, which meets the required standard to use them as a source of finance to the marginalized pastoralists. There is poor recording and book keeping system that create a problem on proper management of their financial resource. This incompetency of committee members contribute much to the in-efficiency of SACCOs and have significant implication on the overall performance.

Despite the fact that all the three clusters under study share the aforementioned limitations, the number and performance of RuSACCOs in southern Oromia is by far better than that of Afar and Ethiopian Somali regional states. From the above figure, Borena zone has 38 SACCOs per *Woreda* on average and Guji zone has 17 SACCOs per *Woreda*, on average. In contrary to this, the data from four *Woreda* cooperative promotion officers of Afar Regional State showed that the region is the least performer. Except Dulesa *Woreda*, which is close to Amhara regional state and most of the dwellers are not pastoralist, other *Woredas* have very few SACCOs. The other *Woreda* in the region considered in this research; viz, Gewane, Amibara and Argoba *Woreda* have 3, 4 and 5 SACCOs, respectively. The *Woredas* cooperatives promotion office also confirmed that the existing SACCOs are very weak in their performance. From the observation of the team and expert information from Jigjiga and Shinille *Woredas* cooperative promotion offices, SACCOs in Ethiopian Somali Regional State is relatively better than that of Afar's and not as effective as the Southern Oromia.

Table 3. Outreach of SACCOs in Pastoral Area.

Place	No of SACCOs			Members in Rural			Member in Urban			Member in both			Saving		
	Rural	Urban	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Urban	Rural	Total
Oromia Region	5,121	921	6,048	288,491	328,528	617,019	68,993	43,795	112,788	356,040	372,323	728,363	240,222,503	332,151,450	572,373,953
Average/Woreda	270	48	318	15,184	17,291	32,475	3,631	2,305	5,936	18,739	19,596	38,335	12,643,290	17,481,655	30,124,945
Borena	381	1	382	19,184	20,609	39,793	271	141	412	19,455	20,750	40,205	14,260,244	315,773	14,576,017
Guji	206	11	217	11,459	7,994	19,453	709	386	1,095	12,168	8,380	20,548	4,398,432	735,879	5,134,311

Source: Own computation from raw data of Oromia Cooperatives Promotion Agency and CSA, 2014.

### *Non-financial Benefits of SACCOs*

Beyond the customary saving and loan service provision, SACCOs in pastoral area bestow a lot of benefits to its member. It empowers women due to its economic benefits, the members develop behavior of living as per their plan rather than spontaneous type of saving and consumption, pastoralists start to live sedentary life and their financial literacy has been improved. In addition to the above,

- ◆ Since SACCOs are strongly rooted in their community the benefit received by members, particularly the non-financial one, has a positive spillover effect on the non-members about saving and empowerment of women.
- ◆ Since they also are guided by a set of underlying values and ethics, they can be considered as schools of social dialogue and democracy. This create a fertile ground inter and intra colleague discourses on the basis of values of self-help, self-responsibility, democracy, equality, equity and solidarity.
- ◆ It also mobilizes self-help and motivates people to make better use of their self-help potential.

### *Opportunities and challenges of RuSACCOs*

#### *A. Opportunities*

- ◆ Sedentary economic activity become the way of life for many pastoralists;
- ◆ Existence of cooperatives with inspiring achievements which has a significant spillover effect on non-members;
- ◆ There are many governmental and nongovernmental organization interested to intervene in rural financing particularly to those who are marginalized by the formal financial sector;
- ◆ Male heads of household show a willing to send the housewife to form cooperatives and to engage in outside activities;
- ◆ The community can be organized with minimum effort of external body;
- ◆ The society has great skill of trade.

#### *B. Challenges*

- ◆ Limited awareness of members and their leaders about cooperative principles and business skills;
- ◆ Financial constraint due to low level of contribution of members (compulsory saving) and negligible voluntary savings;
- ◆ Lack of communication among RuSACCOs to share experience;
- ◆ Malpractice of some *Woreda* level officers;
- ◆ Mobility of the pastoralists leads to annihilation of their cooperative;
- ◆ Sparsely populated nature of the area created a problem to form primary cooperatives and most importantly a union;
- ◆ *Woreda* and higher level administration cooperative office lacked human resource in number as well as the quality that endowed with the knowledge of cooperatives theory and practice to satisfy the demand of cooperatives that need day to day guidance for their smooth operation;
- ◆ Infrastructural problem created a great problem to reach marginalized pastoralists by *Woreda* level officers;

- ◆ There were some cooperatives which were organized for the sake of grabbing the seed money provided by NGOs and thus have less ambition for change.

### 3.4. Comparison of the Three Financial Sectors

Though commercial banks are now getting closer to pastoralist through a number of mechanism including van banking, opening outlets and new branches, and mobile and agent banking, they are primarily concerned on deposit mobilization and local money transfer service. However, they are far from the reach of poor pastoralists for credit access because of their strong collateral requirements. Despite their limited economies scale and not as much as expected, microfinance institutions tried to reach pastoralists in a better manner as compared to banks through provision of small loan at different modalities. However, the financial and non-financial benefits are not comparable to the RuSACCOs. RuSACCOs are more accessible than the other two financial institutions though their limited capacity leaves the economic lives of their members unchanged and credit service is only limited to members. In all the three financial intermediaries what matters is getting credit access, not its interest and fee charge.

## 4. CONCLUSION AND RECOMMENDATIONS

Based on the findings of this study, conclusions are drawn and corresponding recommendations are forwarded as follows.

- ◆ Although the encouraging development of the financial sector competition leads to the introduction of some new financial products, they were not as such innovative to address the rural poor particularly pastoralists. Therefore, financial intermediaries should develop innovative financial products specific to farmers/pastoralists.
- ◆ Rural areas were financially underserved but with ample of opportunities to penetrate this new market including getting stable deposits. Government and development partners should provide clear economic incentive for those institutions willing to serve this segment of the population.
- ◆ Mobile banking and interest free banking were a key step for financial inclusion. However, immediate directions should be given from monetary authority for issues associated with the development of these new financial products including avoiding double taxation problem of *Mudaraba*.
- ◆ Financial institutions started to reach the rural people for saving mobilization purpose than any other time. They should also give emphasis for financing (advancing loan) as well. Insured livestock should be considered for collateral.
- ◆ Banks also should never miss appointments of visiting to the pastoralists' place (market and other places where pastoralists are accessed) when they use van banking.
- ◆ Financial illiteracy was found to be a major factor limiting both the development of the financial sector and the inclusiveness of their services. The government structure at different levels, the financial institutions, and NGOs including PRIME may collaborate in the awareness creation endeavors. Financial training should target the potential people, usually leaders, so that other small pastoralists will definitely follow them.
- ◆ NGOs which intervene in pastoral area to improve beneficiaries' life via donating money directly to the households should look into another method to eradicate the associated dependency syndrome. It would be better if they can make it through in provision of in kind and technical support to strengthen RuSACCOs that can benefit many poor.

- ◆ Actors involved in this sector, which try to solve the financial problem of the pastoralist in a fragmented manner, should coordinate for the better performance of the sector.
- ◆ Government and development partners should give due attention to strengthen human capital of cooperative offices at all levels to facilitate development of SACCOs.

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## 6. ACKNOWLEDGMENT

We are highly thankful for PRIME project and Haramaya University for their financial and material support, respectively. The three field officers of HU-PRIME, namely, Adamu Tefera, Ahmed Ismail and Degu Worku deserve special thanks for their unreserved effort in facilitating the field works and their involvement in the data collection. We are also indebted to Mr. Abdulahi Ferah and Mr. Netsaalem Bahiru (IR3 technical advisors of PRIME project) for their constructive comments to improve the quality of the paper.

**POLICY RESEARCH ON CROSS-BORDER TRADE: CHALLENGES AND PROSPECTS****Habtamu Hailemeskel<sup>1</sup>, Jemal Mohammed<sup>1</sup>, Ashenafi Negash<sup>1</sup> and Mulugeta Getu<sup>1</sup>****EXECUTIVE SUMMARY**

*This research is the examination of the challenges and prospects of cross-border trade in Ethiopia. Cross-border trade is defined as the flow of goods and services across international land borders within a reach of duly defined area. It has two varieties-formal and informal. The former refers to trade in goods or services which is carried out by legally registered traders and fulfills all legal requirements of the trading countries while the later refers to movement of goods in which all or part of the trading activity is unrecorded or unrecognized by the government. and without adherence to procedural requirements of all formal institutions. This research mainly focuses on the informal cross-border trade and formal petty periphery trade. The formal cross-border trade between Ethiopia and neighboring countries (Kenya, Somalia and Djibouti) is also analyzed using a time series data from the National Bank of Ethiopia.*

*Literatures explained that cross-border trade plays a critical role in providing alternative source of livelihood for pastoralists. The major actors in this trading activity are individual traders, women and micro and small enterprises. The researchers, in addition to the literature review, have employed key-informant interviews, household survey and document analysis to determine the volume of trade, the items traded, the contribution of cross-border trade for livelihood diversification and the challenges and prospects of the same.*

*The time series data for 17 years from the National Bank of Ethiopia revealed that the total value of export of Ethiopia to Kenya, Djibouti and Somalia amounts to ETB 61 billion. Fruits and vegetables constituted the dominant share of this trade followed by live animals and chat. The researchers considered the size/volume of import and export contraband as the lowest lower limit of the informal trade as it can never be less than what is seized by authorities. Accordingly, a two years data (2012/13 & 2013/14) collected from ERCA shows that the volume of export contraband is ETB 11.5 million for 2012/13 and ETB 26 million for 2013/14. Live animals constitute 35% of this contraband export followed by cereals (20%), pulses (19%), chat (19%) and others (7%). This indicated the possibility of engaging in the sale of highland agricultural products as alternative livelihood source for pastoralists and pastoralists transitioning out of pastoralism (ToPs) in addition to trade in livestock and livestock products. On the other hand, the value of import contraband for the years 2012/13 and 2013/14 was ETB 245 million and ETB 270 million respectively. Clothes constituted the dominant share*

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(54%) followed by electronic devices (16%), tobacco and cigarettes (8%), and food items mainly rice (5%).

*Directives permitting small scale/petty cross-border trade were issued by the Ministry of Trade to enable easy and affordable access for basic goods by pastoralists and to curb informal/illegal trade. Despite the coming into force of these directives, implementation is far from being realized. The reasons related with lack of awareness of all stakeholders and coordination among them, very old list of items to be traded, restrictive capital ceiling and number of entries, absence of incentives for legal traders. The response collected through a questionnaire shows that cross-border trade plays a vital role in improving livelihood by serving as source of income, consumer goods and self-employment. 60 per cent of respondents believe cross-border trade enables them to get higher prices. 69% of the respondents also generated income through selling their livestock in the last one year. 41% and 51% of the respondents said that engagement in cross-border trade helps them to get clothes and food items respectively. This is a very good indication that cross-border trade can serve as a mechanism to generate income for business establishment and opportunities of business in activities related with cross-border trade like fodder trading.*

*Absence of standard quarantine service, poor quality of animal varieties (owing to poor cattle management, lack of sufficient fodder and the natural breeds of animals), increasing trends of default on arrears that erode the trust between traders, absence of foreign exchange services to neighboring countries' currencies, failure to implement the petty periphery trade directives are among the challenges identifies by this research. Amendment of existing petty trade directives, provision of modern contract enforcement, provision of technical assistance for pastoralists involved in fodder and cattle management and supporting and encouraging pastoralists, agro-pastoralists and ToPs to make use of the opportunity provided by the petty trade directives through awareness creation are among the points recommended for action.*

## 1. INTRODUCTION

Cross border trade (CBT) is a trade which is carried out across national boundaries or between people or business entities of different countries. Kaminski and Mitra (2010) defined CBT as "the flow of goods and services across international land borders within a reach of kilometers specified by law." CBT is broadly divided into two- formal and informal. Formal cross border trade refers to the type of international trade in legal goods and services which is carried out by legally registered traders and fulfills all the legal requirements of the trading countries. Informal cross border trade (ICBT), on the other hand, is defined differently by different authors and institutions. COMESA defines informal cross border trade as trade which is not officially recorded and carried out by small businesses in the region (member countries in eastern and southern Africa) (Njiwa, 2013). Higgins (2012) and Moise-Leeman (2009) defined ICBT as legal but unregulated (unregistered, undocumented and officially unaccounted) trade. ICBT involves large number of participants operating at a lower scale than the formal sector and characterized by easy entry and exit of firms (Dongala, 1993).

Ethiopia has the largest livestock population in Africa and also the major cross border livestock exporter, unparalleled anywhere in Africa, mainly to Kenya, Djibouti, Somalia and Sudan. However, the officially

recorded volume of live animal and meat export is almost negligible, though recently surging, compared to neighbors Somalia and Sudan (Yacob and Catley, 2010). This hints massive volume of informal livestock export from Ethiopia.

This research is mainly a policy research. It also incorporates quantitative data to back the policy recommendations with strong empirical evidence so that it can serve as a springboard in amending (or coming up with new set of regulations) and strengthening existing legal and institutional framework. The research tries to answer the following questions:

- ◆ Which laws and institutions govern the conduct of cross-border trade relevant to the productions and demands of the pastoral communities (these include import-export regulations, monetary regulations-especially with respect to currency used in cross-border trade, availability of custom duty posts, animal health institutions, quality control, infrastructure, etc.)?
- ◆ What are the actual and potential legal, institutional, economic and political obstacles for cross-border trade?
- ◆ What is the relationship between cross-border trade and resilience of pastoralists in PRIME operational areas?
- ◆ How transaction takes place across borders in PRIME operational areas (Ethio-Djibouti, Ethio-Somalia, Ethio-Kenya). This includes identifying the key actors in cross-border trade.
- ◆ Are there available best alternatives for intervention in the expansion and increase of cross-border trade in livestock and livestock products, animal feed and other food items?
- ◆ What is the role of cross-border trade in livelihood diversification?

## 2. METHODOLOGY

For this study, both primary and secondary data were collected in Addis Ababa and the three clusters of PRIME operational areas including Afar, Dire Dawa, Ethiopian Somali Regional State, Borana Zone of Oromia Regional State. The primary data was collected through key informant interviews and household survey. The key informants were interviewed for the assessment includes domestic livestock traders, livestock exporters, milk exporters, retail traders, and experts and officials of different federal, regional and local level government offices including National Bank of Ethiopia (NBE), Ethiopian Revenue and Customs Authority (ERCA), Ministry of Trade (MoT) and Ministry of Agriculture (MoA). A total of 23 organizations and 17 key informant traders were contacted for the study. Moreover, household data was collected from 150 pastoralists in 4 villages of the Eastern and Southern Clusters of PRIME operational areas using structured interview questionnaire. Two villages were randomly selected (two villages from Moyale Woreda-Oromia and Moyale Woreda-Somali and other two villages from Awbare Woreda within 100 kilometers range from the national border of Ethiopia in the PRIME project operational districts of each cluster.

## 3. LITERATURE REVIEW

### 3.1. Policy Debates on Informal Cross Border Trade

Views regarding the ultimate future of ICBT are not unanimous among scholars. Little (2007) argued that ICBT should be encouraged on the ground that it is a normal market response to regional price disparities and inefficient export regulations. Moreover, ICBT is a source of regional food security when the domestic production and market fails to meet food demands. Similarly, Eid (2014) on his analysis of cross border trade along the Ethiopian Somali borders, argues that restrictions imposed by the Ethiopian government to

hibit ICBT benefits only large cattle traders and has detrimental effects on the livelihood of herders and small traders. Contrarily, Lesser and Moisé-Leeman (2009) contended the wide spread practice of informal cross border trade in sub-Saharan Africa, despite its short run importance for poverty alleviation, on the following grounds:

...in the longer run, it is likely to have negative economic and developmental effects, which might further marginalize Sub-Saharan African economies. First, informal cross-border trade creates *unfair competition* vis-à-vis formal traders, reduces the incentives to invest in the formal economy and lowers business opportunities in regional and global markets, which diminishes the prospects for private sector (and overall economic) development in Sub-Saharan Africa. Second, informal cross-border trade *lowers the efficiency of measures* put in place to ensure health, safety and environmental protection. Agricultural commodities which are traded informally, for example, escape sanitary and phytosanitary controls meant to ensure adequate food safety at home and avoid proliferation of diseases across borders. Third, informal trade *erodes government revenues*. Millions of dollars are lost annually in unpaid customs duties and value-added tax (VAT). Such losses are particularly significant for Sub-Saharan African countries for which trade taxes still account for an average 25% of total tax revenue and where VAT collected at the border often represents more than 50% of total VAT revenues. *Finally*, unregistered trade flows lead to unreliable external trade statistics which might hinder the formulation of appropriate trade and macroeconomic policies.

Governments in the Horn of Africa usually overlook the economic importance of CBT due to lack of data on its economic contribution. As a result, CBT did not get policy support proportional to its economic contribution in the region. Hence, data generation and research on the role of CBT, particularly ICBT, is crucial to foster informed policy making in the region. The data for formal CBT mainly comes from official records. The measurement of ICBT, however, is very challenging and costly as it is passes through remote and invisible routes to escape official regulations and payments (Little, 2005). There are different methodologies to measure different categories of ICBT based on the type of institutional sets of rules that it evades. (ECA, 2013; Nile Basin Initiative, 2012).

### 3.2. The Status of Cross Border Trade

Although it is difficult to provide accurate figures on the share of formal and informal cross border trades due to lack of data on the informal economic activity, different studies and rough estimations avow that the informal sector in general plays almost equal economic role with the formal sector in Africa (Lesser and Moisé-Leeman, 2009). The share of informal cross border trade from the total cross border trade among neighboring African countries might be even disproportionately larger than the share of the formal economy. According to Little (2009) around 90% of the cross border trade along five Eastern African borders, including Ethiopia-Somaliland, Southern Somali-North Eastern Kenya, Western Ethiopia- Eastern Sudan, Southern Ethiopia – Northern Kenya and Northern Uganda – Southern Kenya, is informal cross border trade. According to Jabare *et al* (2007), in 2005-06, the volume of informal live animal exports from Ethiopia was estimated at 328,000 head of cattle and 1.1 million sheep and goats which is more than seven times the volume of formal exports. Sintayehu, *et al* (2013), based on data from different sources, indicated that the informal cross border livestock export from Ethiopia during the years 1981–2001 is six times of the volume of formal export and twice of the value of export.

The trend of CBT in the Horn of Africa, though generally increasing over time, has shown significant volume fluctuations and change of patterns (Mahmoud, 2010). The high transaction costs of export in

terms of time and money due to excessive regulations involving a number of ministries and agencies and related fees also contributed to the high level of informal trade while limiting the growth of formal trade across the international borders of Ethiopia (Solomon *et.al*, 2003).

ICBT along the Southern Horn of Africa is mainly carried out by traders of the same ethnic group on both sides of the border. While such ethnic network nurtures trust and security for trades it makes the government effort to control cross border trade largely ineffective and contributes for the growth of ICBT at the expense of formal CBT (Mahmoud, 2010; Abdurahman, 2014).

### 3.3. Role of CBT for Pastoral Livelihood Improvement

Cross border trade plays crucial economic, political and social roles for pastoralists of southern horn of Africa, including Ethiopia, Kenya and Somalia. It is a critical source of livelihood for pastoralists of the horn (Mahmoud, 2010). The cross border trade network of the Horn of Africa supports more than 17 million people in the region including livestock producers, traders, trekkers, fodder producers and traders, brokers and other marketing service providers who earn their livelihood directly or indirectly from the trade (USAID, 2010).

Yacob and Catley (2010), analyzing the relationship between the livestock marketing behavior and wealth among Somali and Borena pastoralists of Ethiopia, provided interesting analysis of the interaction between livelihood status of pastoral households and livestock market engagement. According to the study, pastoralists in general are unwilling to sell livestock unless they are forced to do so with immediate cash need or drought. This is because "livestock provides more rate of return than any other alternative livelihood activity. Moreover, poor households- owning smaller stock of livestock- tend to diversify their livelihood activities than wealthier households because the later can entirely rely on the sale of livestock to generate sufficient cash but the former have few livestock to sale. The study further found that while over 90% of all the pastoral households participated in marketing activity at least once during the period 2000-2002, there is clear inverse correlation between number of marketing activities and wealth. This implies poor households depend on market more than well-off households and hence CBT significantly impacts on the livelihood of poor pastoral households in Ethiopia.

Cross border trade enhances food security through at least in two mechanisms (Little *et.al*, 2001). The first is through the supply of grain and other food items from surplus areas to deficit areas which makes food available and its price stable and affordable for the poor in the food deficit areas. Second, cross border trade helps traders to sell their products at relatively higher prices in the international market and generate more income. It also keeps prices of domestic products up and incentivizes domestic producers produce more and generates more income. Cross border trade benefits not only producers and traders linked with the value chain but also creates business opportunities for marketing service providers such as processors, transporters, storage facility providers, and market facilitators such as product graders and marketing information collectors and disseminators (WB, 2007). Moreover, cross border trade creates employment and business opportunities for ancillary services providers such as hotels, restaurants, cafeterias, livestock drug vendors, commodity sellers, chat traders, holding ground and loading ramp providers, among others (Yacob and Catley, 2010). The income from cross border trade can also be an important source of saving and capital to startup or strengthen alternative livelihood activities which provide more income, employment and security for the household.

In addition to its benefit for pastoral households and trade, CBT, particularly formal cross border trade, is a source of revenue for public authorities through customs duty and charges, and hence a source of fund for infrastructural investment. However, African governments reap only small proportion of the tax

revenue from what they could potential get from CBT (Golub, 2014). Though the government could not directly tap tax revenue from ICBT, CBT indirectly increases tax revenue by widening tax base through its effect on the expansion of business and employment opportunities in related and ancillary activities. It also creates employment opportunities for local authorities or self-appointed officials, tax collectors, movement permit issuers, watchmen, market attendants, and even armed guards in some cases (Yacob and Catley, 2010). CBT also generates foreign exchange earnings for the economy

Cross border trade also harness social relations and cultural understanding among trading communities along the border of trading nations and reduces ethnic conflicts (ibid). It also facilitates regional integration promotes efficiency. Hashim and Meagher (1999) conclude that "Cross-border trade offers, by far, the most efficient financial and commercial infrastructure that is presently available for regional trade. It could, given the appropriate policy framework, contribute to the rapid and massive expansive of markets for local industrial and agricultural goods".

#### 3.4. Participants of CBT and Distribution of Benefits

CBT is a means of livelihood for different sections of the pastoral community including producers, traders, livestock trekkers, fodder produces, brokers and other marketing service providers who earns their livelihood directly or indirectly from the trade (USAID, 2010). Most of the participants of ICBT are individual traders, large proportion of which are women and micro, small and medium sized enterprises (Gor, 2012).

Women are active participants of CBT, particularly ICBT. The participation of women in cross border trade enhances food security and reduces poverty among the vulnerable population as women usually constitute the poorer section of society compared to men as well as women are the major dealers of food items, such as maize, fruits and milk (USAID, 2012). Most women engage in petty ICBT in which the gains are not as lucrative as large scale livestock cross border trade which is mainly dominated by men. Women also pursue their trading activities under precarious security conditions. (UNIFEM, 2009 as cited in Shaw, 2010).

While the CBT in food stuffs and household consumables across the Horn is dominated by the poor, mainly women as discussed above, many of the actors involved in cattle CBT are not poor by local and regional standards and only few are women. Indeed, there is considerable disparity in the volume of cattle that different CBT participants are able to command: about 20% of trade account for 60% of the trade and 50% of traders control less than 15% of the trade (Little, 2005). Generally, large-scale male cattle traders based in Nairobi who also owns the means of transportation benefit the most from the cross border livestock trade in the horn of Africa. Having the trucks to transport cattle gives these traders the flexibility to purchase livestock from every corner of the region (Little *et al.*, 2001).

#### 3.5. Commodities of CBT

So long as agriculture is the dominant mainstay of the people of eastern Africa, as many developing countries, most trade in the region dominantly involves agricultural products such as crops, livestock and livestock products. Among agricultural products, livestock, which is the major product of pastoralists, is the main commodity of regional cross border trade in the horn of Africa, including Ethiopia (Little, 1998). Next to agricultural products, cross border trade in the region involves manufactured consumable such sanitary and beauty products, medicines, footwear and textiles (Masinjila, 2008). According to Little (2005), the items of trade across the international borders of the Horn of Africa (Somaliland-Ethiopia and Somalia - Kenya borders) include livestock, cereals, processed and semi-processed food stuffs (such as pasta, sugar, wheat flour, and tea), kerosene, charcoal and chat.

### 3.6 Barriers of CBT

Government interventions in the forms of too many regulations involving several ministries and offices (such as trade, health, industry, agriculture ministries and other institutions related with customs regulation and standard setting and conformity assessment agencies), lengthy bureaucracy and unduly charges in visa issuance and export clearance, taxes, banning or restricting movement of goods and vehicles through borders has been a major barrier for the growth of CBT, particularly formal CBT in the Horn of Africa. Governments in the region (such as in Ethiopia and Kenya) usually adopt hostile policies towards it on the ground that governments cannot reap tax revenues from ICBT (Little, 2005; Pavanelo, 2009). However, it should be noted that even if governments cannot collect tax from the full size of the actual CBT carried out across their borders, CBT through its contribution for business expansion and employment creation in the domestic economy widens the tax base of the economy.

Other challenges include, among others, disease, high cost of transportation, lack of marketing information, lack of access to credit, lack of marketing infrastructure, inefficient marketing system, feed and water shortages, lack of trained manpower, high business risk, insecurity and low genetic potential (Simpkin, 2004; *ESGPIP, 2011*; WB, 2007). Hence enhancing the performance of cross border trade to bolster its contribution for pastoral livelihood improvement requires resolving these problems.

## 4. RESULTS AND DISCUSSION

### 4.1. Formal/Official Cross Border Trade

#### 4.1.1. The legal and institutional framework

Formal/official cross border trade is defined as a trade which is recorded, recognized by relevant institutions, and carried out in consonance with the country's required procedures (Tegegne & Alemayehu, 2002). The formal/official cross-border trade has two varieties: large-scale cross-border trade carried out by enterprises which large financial capacity and petty cross-border trade involving poor low-income individuals. The latter is the focus of this research and it is discussed in detail in the next sections. The legal and institutional framework for the large-scale cross border trade is discussed as follows:

*The 1960 Commercial Code of Ethiopia:* This law provides for the definition of traders and enumerates trading activities. It also governs the conduct of trade by sole proprietors, partnerships and companies. The formation and governance of various types of business organization is also governed by this law.

*Commercial registration and business licensing proclamation no. 686/2010:* as the above law is very old some provisions are amended by this proclamation. The amendment specifically applies with respect to the list of commercial activities, commercial registration and licensing. This law takes into consideration the federal structure of Ethiopia's government and apportions powers for central government and regions accordingly. As the name indicates, it sets rules applicable for commercial registration, licensing, and renewal of sole proprietors and local and foreign business organizations. It also stipulates the power of other government organs, such as, Ministry of Trade, Investment Agency, Ministry of Agriculture, Ministry of Industry and Ethiopian Revenues and Customs Authority, in during and after registration of businesses.

*Customs proclamation No. 859/2014:* This proclamation sets out the customs formalities that exporters and importers should meet and the measures that will be taken for those who violate the requirements. This law sets out that, as a general rule, any import or export goods shall be subject to customs declaration.

Customs declaration is a form or document prepared by ERCA in which the details of import, export or transit goods are described for the accomplishment of customs formalities. The details to be included in the declaration are transportation document, invoice, bank permit, packing list, certificate of origin. The details are provided under various directives issued by ERCA including Directive No. 16/2001 and Directive No. 33/2001.

There are also institutions meant for enforcing these laws. Ministry of Trade is the major Federal Government executive organ entrusted with the powers pertaining to local and foreign trade. Its powers, among others, include: create conducive conditions for the promotion and development of the country's export trade and extend support to exporters; control under invoicing in cooperation with ERCA; control the use of business licenses for unauthorized purposes; control the qualities of export and import goods; prohibit the importation and exportation of goods that do not comply with the requirements of the standards, and work with concerned organs in this regard; and control the compliance of goods and services with the requirements of mandatory Ethiopian standards.

Ethiopian Revenue and Customs Authority is another institution that has roles (Proc No. 587/2008, Art.8) in the regulation of CBT. It establishes custom posts that serve as a legal entry and exit points for import/export trade across borders. In the past there were only two official customs offices in Somali Region, located in Jigjiga and Kebri-bayah. In early 2010, the federal government made the decision to establish additional customs offices in the border areas of Somali Region to curb informal trade in the region, both incoming and outgoing (Abdurahman, 2014). Some of these new custom offices are located in the border area between Somali Region and Somaliland, where the CBLT is active, including Togwajalle, Harshin, Hartashiekh, Daror and Gashamo. The establishment of the new customs offices coincided with three changes in trade policy. First was the lifting of a livestock import ban in late 2009 by Saudi Arabia, which is the destination of 94 percent of livestock exports from the Horn of Africa, including Ethiopia. Secondly, in 2010 the federal government permitted all important food items to be imported duty free into Somali Region. This also enabled customs agents to closely monitor cross-border livestock flows. Thirdly, in the GTP, the government has set an ambitious target of increasing export earnings from meat and live animal export.

Federal Police Commission has the responsibility to organize and deploy police force to prevent criminal offences committed in violation of customs and tax laws. The Federal Police force is empowered by law (Proc. No. 587/2008, Art 18) to control contraband activities; detect and apprehend criminal suspects and bring them before courts of law; seize contraband goods and submit to the Authority; accompany customs transit goods and vehicles directed to their destiny; and safeguard customs checking points and national frontiers through which illicit goods may be transited across the border;

Because the large scale cross border trade involves convertible currencies and banking procedures like opening letters of credit by an importing country the National Bank of Ethiopia (NBE) and Commercial Banks have their own crucial roles to play in CBT.

#### **4.1.2. The volume of the formal cross-border trade**

The data on the formal trade of Ethiopia with Djibouti, Kenya and Somali was obtained from the National Bank of Ethiopia. The researchers used time series data on the Export and Import of Ethiopia with its neighbors from September 1998 to June 2014. The total export value of Ethiopia to all of the three countries during the stated period amounts ETB 61 billion. Somalia is the major export destination of Ethiopian products, among the other countries. Ethiopia's formal export to Somalia amounts ETB 55

billion, while the value of export to Djibouti and Kenya amounts ETB 5.84 billion and ETB 138 million, respectively. Hence, Somalia represents a major foreign market destination for Ethiopian products.

Regarding the composition of trading items, fruits and vegetables are the dominant export items of Ethiopia to its neighboring countries, accounting for 66.65% of the total export value during the period, followed by live animals (25.56%) and chat (6.28%). This indicates that there is high potential of fruits and vegetables export to neighboring countries from irrigable agro-pastoralist areas of Afar, Somali and Oromia Regional States of Ethiopia, where PRIME project operates. Moreover, the finding of the study reveals that live animal export is an indispensable source of livelihood for Ethiopian pastoralists given that the pastoralist areas of Ethiopia are the major sources of live animal export to neighboring countries. Hence, tackling the obstacles of live animal trade and export to neighboring countries should be an integral part of the development plan to enhance the livelihoods of pastoralists in Ethiopia.

The trend of export over the stated period was highly volatile with a yearly mean export of ETB 3.6 billion and standard deviation of ETB 9 billion. This implies that though the export market potentially provides livelihood opportunity for Ethiopian pastoralists and agro-pastoralists, it also presents a major risk due to demand/price volatility and requires supportive government policies such as strengthening of the provision of insurance services for traders and pastoralists.

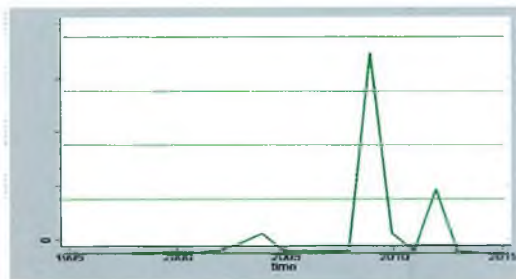


Figure 1. Trend of Formal Export of Ethiopia to Somalia, Djibouti and Kenya from 1998 to 2014 (in millions: amount is in ETB)



Table 1. Formal Export of Ethiopia to Djibouti, Somalia and Kenya (1998-2014)

Year	Total value of official export in ETB
1998	998,609
1999	48,100,000
2000	217,000,000
2001	75,500,000
2002	529,000,000
2003	1,860,000,000
2004	3,590,000,000
2005	394,000,000
2006	452,000,000
2007	287,000,000
2008	379,000,000
2009	37,000,000,000
2010	3,610,000,000
2011	514,000,000
2012	11,800,000,000
2013	297,000,000
2014	10,900,000

Source: NBE, 2014.

Table 2. Total Value of Official Export by Country of Destination (1998- 2014)

Country	Total Value in ETB (1998-2014)	percent
Djibouti	5,840,000,000	9.56
Kenya	138,000,000	0.23
Somalia	55,100,000,000	90.21
Total	61,078,000,000	100

Source: NBE, 2014

Table 3. Total Value of Formal Export by Commodity (1998- 2014)

Items	Value of formal export (ETB)	Percent
fruits and vegetables	40,673,439,210	66.65
live animals	15,600,000,000	25.56
chat	3,830,000,000	6.28
others	923,253,261	1.51
total	61,026,692,471	100

Source: NBE, 2014.

#### Informal trade

Informal cross border trade in this study refers to both the unofficial inflow and outflow of goods across the Ethiopian border. It is also defined as a "movement of goods in which all or part of the trading activity is unrecorded or unrecognized by the government, and without adherence to procedural requirements of all

formal institutions" (FAO, 2008). Since data on informal /illegal cross border trade is not available in Ethiopia, we used the data of contraband goods seized by customs authority branches and federal police. This data, however, is not representative of the whole informal trade as only part of it is seized. Yet it indicates how large would the informal trade be by setting the lower limit. That is, the size of the informal trade can never be less than what is seized by authorities. The size of apprehended illegal trade depends on two factors: the size of the illegal trade and the capacity of authorities to seize illegal traders.

Regarding the second factor, the customs authority officials admitted that the capacity of ERCA and federal police to apprehend illegal traders across the Ethiopian borders is limited. The officials mentioned ethnic similarity on both sides of the border, long and plain borders of Ethiopia with neighboring countries, such as Somalia, logistical problems of the Federal police of Ethiopia, tacit agreements between border controllers and illegal traders and lack of cooperation among the public has weakened their capacity to seize illegal cross border traders along the Ethio-Djibouti, Ethio-Somali and Ethio-Kenya borders.

On the other hand, the size of the illegal trade depends on the relative cost of informal vs formal import/export trade and the capacity of government authorities to control illegal trade. The formal foreign trade of Ethiopia is highly centralized and not suitable for people living close to the border far away from the center of the country. Import and export trade licenses can be issued only by the Federal Ministry of Trade located at Addis Ababa and its satellite office -the Dire Dawa Foreign Trade Office. Hence, any trader who want to get license for import and/or export trade should go to Addis Ababa or Dire Dawa and need to stay many days or return many times and incur a lot of costs to these cities to get the license. Moreover, the imposition of five types of taxes (Customs Duty, Excise Tax, Value Added Tax (VAT), Surtax and Withholding tax) on imports of Ethiopia inflates the cost of formal import trade to Ethiopia. Hence, it is obvious that formal foreign trade, particularly import, is too costly for pastoralists and small-scale traders located in pastoral area towns. Therefore, pastoralists and traders located near the Ethiopian borders either buy products brought from the center of the country, mainly Addis Ababa, at a very high price or resort to illegal trade and buy products at the nearest border town of neighboring country at a low price taking all the risks of arrest by post controllers and federal police.

The two factors explained above imply that the volume of informal or illegal trade across Ethiopian borders with Djibouti, Kenya and Somalia might be by far larger than what is seized and reported by Ethiopian Revenue and Customs Authority branches. We caution, therefore, that the data on the value of seized contraband goods only sets the lower limit of the illegal trade and the actual value would be much larger. We provided the analysis of the data on the value of seized contraband goods reported by ERCA in 2012/13 and 2013/14 fiscal years below.

In 20012/13, contraband export goods worth of more than 11.5 million Birr was seized and in the next fiscal year, 2013/14, the value increased by 126% and reached more than ETB 26 million. More than 75% of the seized contraband goods are reported by Jijiga ERCA branch which is consistent with the volume of the formal export. Commodity wise, live animals, cereals, pulses and chat constitute more than 90% of the value of seized contraband goods with percentage shares of 35%, 20%, 19% and 19%, respectively. The value of seized contraband export goods is by far lower than the value of formally exported goods. Moreover, while fruits and vegetables overwhelmingly dominate the formal export trade, grain, live animal and chat are the most important items of the informal export trade. Live animal and chat also make a significant portion of the formal trade. This implies that while pastoralists would sell their main product, livestock, across the border, traders in pastoral areas can also engage in selling highland agricultural products such as chat and grain to neighboring countries. Hence, selling not only pastoralists' local

products but also highland agricultural products such as fruits and vegetables, grains and chat across the border would be an important livelihood option for pastoralists and TOPs in PRIME project operating areas.

The value of seized contraband import goods in 2012/13 and 2013/14 was ETB 245 million and ETB 270 million, respectively. The geographical disparity observed in the export cross border trade is not observed in the latter case; 30%, 26%, 25% and 19% of the seized import goods were reported by Moyale, Jigjiga, Dire Dawa and Mille branch offices of ERCA, respectively. In terms of trading commodities, clothes constitute 54% of the total value of illegal imports while electronic devices, tobacco and cigarettes and food stuffs, mainly rice, constitute 16%, 8% and 5% of the total reported value of seized smuggled goods, respectively.

Table 4. Seized Import Contraband Products by Trading item

Item description	Share of value in 2012/13 and 2013/14 (percentage)
Clothes	54
Electronic devices	16
Tobacco and cigarettes	8
Food stuffs	5
Cosmetics	2
Others	15
Total	100

Source: ERCA, 2014

Table 5. Seized Import Contraband Products by Reporting Branch Offices

Place	Value (ETB)	Percentage share
Moyale	154,204,047.3	30
Jigjiga	134,088,234.3	26
Dire Dawa	128,512,170.3	25
Mille	98,528,511	19

Source: ERCA, 2014.

#### 4.3. Petty Periphery Cross Border Trade (PPCBT)

The periphery cross border trade is a special type of formal cross border trading activity allowing Ethiopians living close to the country's border to the export and import limited amount of basic commodities. This special cross border trade was initiated in 1994/95 fiscal year by the Ethiopian Ministry of Trade. This scheme requires traders to integrate both export trade and import trade in a sense that the volume of import should be equivalent to the volume of export trade. The directives regulating the periphery trade in Ethio-Djibouti, Ethio-Kenya and Ethio-Somali borders have the following common features (Note that the discussion is based on the latest petty Periphery cross-border trade directives. These are Petty Periphery Trade Directive No. 4/1992 across the Ethio-Kenya Border, Directive No. 6/1997 across the Ethio-Djibouti Border and Directive No. 1/1995 across the Ethio-Somali Border. They are almost identical in their structure):

**Purpose:** The following are the purposes behind the permission of formal petty cross-border trade, as mentioned in the preamble of the directives:

1. Allowing the people near the border to import some basic goods because the basic goods frequently used by local populations living near the border do not reach the area in adequate quantity. Even if goods reached these locations, their prices would be so high due to transportation costs becoming unaffordable for the poor. Moreover, Ethiopians near the border might have different feeding habits and lifestyles and their food and other commodity demands may not be completely met by domestic products. It is, therefore, imperative to allow the border people to buy their basic consumption items at the nearest towns of neighboring countries.
2. To curb illegal/informal trade across the border by allowing the people to freely import basic commodities as well as guiding the people towards adhering to the formal trade procedures of Ethiopia and thereby checking the widespread informal trade across Ethiopian border.

**Implementing Institutions:** Implementing institutions is identified by the directives governing petty periphery cross-border trade. The direct implementers are Regional Trade Bureaus, woreda trade and industry offices, and customs authority established in duly recognized custom posts across borders. Regional trade bureaus are delegated by the Ministry of Trade to issue business license or to assign woreda trade offices to do the same. They are also required to determine the prices of exported items for the purpose of monitoring whether traders comply with the capital restriction. Customs authorities are required to collect taxes and check whether the imported and exported items are those listed in the directives. They are also required to set the prices for imported items to check whether traders comply with the capital restriction.

In addition, the Trade and Industry Bureaus of the Regional States delegated by the Ministry of Trade are obliged to submit bi-annual reports as to the number of licenses and relicenses given in their respective scope of influence, the list of unit tradable items' price used and the challenges faced during implementation. Branch Custom posts used as entry and exit points for petty traders import and export (Ethio-Djibouti-Deweale & Galafi; Ethio-Somali- Togowuchale, Alaybede, Debele Weyni and Teferiber; Ethio-Kenya: Moyale) are also required to submit quarter statistical reports on import and export through the petty trade scheme to the Ethiopian Revenue and Customs Authority (ERCA). ERCA is also expected to report to the Ministry of Trade and Industry (now the Ministry of Trade), for Ministry of Inland Revenue (which is not currently in the executive structure of the country) and the National Bank of Ethiopia. This is very important to ensure the formality of the trade and generate the required information for decision making purposes. However, it was never complied with since implementation is not commenced yet.

**Distance to be covered:** The area within which legal traders can reach through this scheme is determined by the directives in the three regions. With respect to the petty trade across Ethio-Djibouti and Ethio-Somalia borders this is provided in terms of the towns where cross-border trade can take place. Every Ethiopian residing in these areas can engage in this trade. It is also required that the source as well as the destination of importable and exportable items should be the towns mentioned in the directives. PPCBT can be legitimately carried out in the following towns nearby the Ethio-Somali Border: Awebere, Shilabo, Togowechale, Ferfer, Debel, Weyni, Dolo Bayo, Eneguh, Dolo Ado, Bihodle, Kudu, Dumo, Dudub, Duruksi, Alay, Bedey, Elanle, and Bare. Trades residing in the following towns nearby the Ethio-Djibouti Border can also involve in PPCBT: Dich'oto, Dubti, Manda, Detbahri, Elidar, Logia, Asaita, Mile, Afabo, Afdera. However, the case is different in the Ethio-Kenya border. Traders can engage in petty trading activity within 200 kilometers radius from the town of Moyale.

**Items to be traded:** The items that traders can import/export through this scheme of petty trade are listed in each directive (see Tables 6, 7 & 8 below). Traders having a petty trader's license can only import and export items which are specifically indicated in the directives.

Table 6. Items on Petty Trade List for trading activity across Ethio-Kenya Border

Items to be exported	Items to be Imported upon payment of tariff and tax
◆ Crop /except cereals and oil seeds	◆ Cinnamon/Tea Spices
◆ Ginger	◆ Soap
◆ Mace	◆ Tin/ Corrugated Iron
◆ Black cumin	◆ Jerry can and tub
◆ Garlic	◆ Lotion and cosmetics
◆ Fenugreek	◆ Exercise book/writing pads
◆ Fruits and vegetables	◆ pencil
◆ Egg	◆ Shoes made of plastics
◆ Butter	◆ Paint used for house surface decoration
◆ Industrial products produced in Ethiopia	◆ Salt
	◆ tea
	◆ Cooking oil
	◆ Kitchen utensils
	◆ Umbrella
	◆ Mattress made of Sponge

Table 7. Items on the petty trade list for trading activity across Ethio-Somali Border

Items to Be Exported	Items to be imported upon payment of customs duties & taxes
◆ Sheep	◆ Cigarette
◆ Sheep	◆ Cigarette
◆ Goat	◆ Thermos, glass, and plate
◆ Camel	◆ Joss-stick
◆ Milk	◆ sugar
◆ Cattle	◆ Metal pot
◆ Forest Resin	◆ Dry nut
	◆ rice
	◆ Battery/ with the dry cell battery
	◆ Salt
	◆ pasta
	◆ macaroni
	◆ wheat flour
	◆ Clothes customarily used by peoples living in the border
	◆ Soap for clothes and body
	◆ Carpet for floor covering and for worshipping

Table 8. Items on Petty Trade List for Trading Activity across Ethio-Djibouti Border

Items to be exported	Items to be imported upon payment of tariff and taxes
<ul style="list-style-type: none"> <li>◆ Animals/oxen, goat, sheep, camel/</li> <li>◆ Animal products/milk, butter, honey/</li> <li>◆ Vegetables and fruits produced in the locality</li> <li>◆ Spices</li> <li>◆ Grained bean and pepper</li> <li>◆ Artifacts produced within the locality</li> </ul>	<ul style="list-style-type: none"> <li>◆ Cigarette</li> <li>◆ Thermos, glasses</li> <li>◆ Cooking oil (Gallon as unit of volume)</li> <li>◆ Pasta, Macaroni, Wheat flour/</li> <li>◆ Milk powder</li> <li>◆ Grained coffee</li> <li>◆ Sugar</li> <li>◆ Dry nut</li> <li>◆ rice</li> <li>◆ Juices</li> <li>◆ Packed foods/biscuits</li> <li>◆ Metal pots</li> <li>◆ Joss-Stick and Incenses</li> <li>◆ Shoes/demanded by the residents in the area</li> <li>◆ Textiles/demanded by the residents in the locality</li> <li>◆ Radio, fan, Air conditioner</li> <li>◆ Matches</li> <li>◆ Jar</li> <li>◆ Carpets made of plastics and textiles</li> </ul>

**Capital Restriction and Number of Entries Permitted:** Traders engaged in petty trade operates within the capital limitation which is imposed on the value of the goods they want to import or export. In the Ethio-Kenya border traders with petty trader license can import goods having a value of 10,000 ETB per round and they are allowed only two entries per month. Traders cannot enter the Kenyan border more than two times in a month for importing/exporting goods. Therefore, the monthly capital limitation is 20,000 ETB. In the Ethio-Djibouti border, the capital restriction and the number of entries allowed is not clear. However, there is indirect indication of the value of exports in the directive. It is stated that livestock can be exported twice a month in two alternative ways. The first is that if the exporter wishes to export live animals of the same species, he/she can export three oxen, three camels or 30 sheep and goats per a single entry. The second alternative is applicable when the exporter engaged in petty trade needs to export live animals of different variety at a time. In this case the exporter can export one ox, two camels and seven goats and sheep. Since the value is not clearly stipulated in the directives, this will certainly cause difficulty in implementation. In addition, it fails to provide sufficient flexibility for traders since it provides only two alternatives. Petty traders that need to trade in legitimate tradable items other than live animals are not provided with clear guidance too. Petty traders operating in towns along the Ethio-Somalia border operates their business within the 10,000 ETB restrictions per month. Petty export trade in permitted items is free from payment of any kind of duties. The traders can export a maximum of 30 goats and sheep or three, and oxen three camels during a single round. The directive didn't provide another

alternative mix of animals if traders want export of that kind. The number of entries per month is restricted to two rounds only.

**Requirements for Licensing and renewal of license:** Entry into petty periphery trade is not hampered by cumbersome regulatory procedures. In all the areas under study, the traders were required by the directives only to fill in a very simplified form with two photographs and 25 ETB payment to get the license. It is clearly indicated in all Petty Periphery Trade directives that, in matters not specifically covered by the directives, the Commercial Registration and Business Licensing Proclamation (Proc. No. 686/2010) and its amendment (Proc. No. 731/2012) will be applicable. The license should be renewed every year upon payment of 25 birr. Using the license as a cover for illegal trading activities and failure to adhere to the obligations stipulated under the directives amounts to the revocation of license and new license may not be given for a trader involved in such activity. A trader will be totally banned from conducting a petty peripheral cross-border trade if he commits such crime for thrice.

**Implementation and Enforcement:** Though it has been more than a decade since the periphery cross border trade is initiated, it is not yet implemented in many border areas of the country. In Moyale, it was implemented for one year (in 1993 E.C shortly after the coming into force of the 1992 Petty periphery trade directive) and a total of 245 traders were registered and licensed to engage in this trade. However, they cease to continue their business due to various factors mentioned in the coming section that deals with the challenges of petty periphery trade. Majority of traders in the area are not indigenous inhabitants. Most of them came from other parts of the country. Inhabitants are involved in the hidden transfer of goods (Melkamu Tsehay, personal communication). Part of the areas lack administrative commitment to take strong measure against illegal traders. We have learned that it was never implemented in Afar Region/ Galali despite the fact that the directive was amended and improved three times since 1990 taking into account the challenges faced during implementation. In Somali regional state, the directive allows this trading activity in and around 15 border towns, but it is only in Togowuchale that some traders has taken the license since April 2014. The directive applicable in the Ethio-Somali border is also amended three times since the first directive which was issued in 1990.

#### 4.4. The Role of Cross Border Trade for the Livelihood of Pastoralists

The finding of the study indicated that cross border trade plays an indispensable role for the livelihood of pastoralists in the PRIME intervention areas. It is a source of income, consumer goods and employment. As per the survey data, 60% of the respondents are in favor of cross border trade. Similarly, 60% of the respondents believe that CBT enables them to get higher price for their livestock, which is a major product of pastoralists. Around 92% of the respondents generated income in the last one year through selling their livestock across the border or selling to livestock exporters. 69% of the income of the respondents in the last one year, 2006 E.C, was generated from the sale of livestock across the border or at border livestock markets. Moreover, 18% of the income of respondents was generated from business activities. This might imply that being close to the border and engagement in cross border related trade activities helped pastoralists to generate capital for the establishment of businesses. Further, the cross border trade might open up business opportunities in allied activities. The traders participated in the key informants we contacted also avowed the importance of cross border trade as a source of capital to establish household business. Likewise, 51% and 41% of the respondents said that engagement in cross border trade helped them to obtain food items and clothes, respectively.

Table 6. Source of Income in the Last 12 Months (July 2013 –July 2014)

	Source of income	Amounted earned (in ETB)	percent
1	Sale of livestock	985,540	69
2	Sale of crops	61,480	4
3	Own business/trade activities	256,160	18
4	off-farm employment	59,370	4
5	Wage employment	45,031	3
6	Remittances	19,200	1
7	Other	0	0
	Total	1,426,781	100

Source: Own Survey, 2014.

Table 7. Summary of the Benefits of Cross border trade for Pastoralists

Description	Number of respondents	%
Favour Cross border trade	93	60.39
Get higher price for livestock	91	59.48
Buy food	78	50.65
Buy cloth	63	63

Source: Own Survey, 2014.

#### 4.5. Challenges of Cross Border Trade

The participants of the cross border trade in the PRIME project operational areas experience several problems. The first of these problems is the contention between illegal/informal cross border traders and the government. The traders, pastoralists and local authorities we interviewed for this study complained that border controllers, particularly federal police, confiscate their animals even before entering the 15 kilometers-from-border zone which is set illegal by customs authority. This zone is known as "customs frontier strip" as per the new customs proclamation (Art. 2 (44) of the Customs Proc. No. 859/2014). This proclamation also states that this area should be used for border crossing or transport of goods only by persons entitled to such activities on the basis of laws or international agreements. Goods seized in the customs frontier strips destined for illegal exportation are considered as contraband. They also mentioned the problem of language barrier to communicate with federal police. Some others complain that there are pastoralists who are normally living and grazing their livestock within the prohibited zone and that the law does not take the normal livelihoods of pastoralists in to account. Moreover, some livestock markets, such as that of Moyale, are normally within the 15 kilometers limit from the border and banning the trekking of animals to such markets might conflict with the normal livelihoods of pastoralists as well as traders in these areas. Though it is understandable that pastoralists and traders should be abided by the country's international trade laws, special legal windows, such as the periphery cross border trade initiative, should be created and dully implemented to accommodate the situations of pastoralists living close to the country's border.

The second problems relates to physical infrastructure. These include poor road infrastructures, lack of marketing infrastructures and lack of vehicles for transportation of people, animals and commodities.



The third problem is absence of standard quarantine service in the country in general and in the PRIME operational areas in particular. Though the government and other private entities provide quarantine services, the services are not standardized and not acceptable by importers at the importing countries. Hence, the animals are re-quarantined in neighboring countries and traders do not have incentives to take up the service. This problem is prevalent in the eastern cluster (Ahmednur Mohammed, personal communication).

The fourth problem is poor quality of animal varieties. Particularly in Afar region, the weight of most of the animals does not meet the export requirements and hence they don't attract exporters nor fetch good price. Hence, traders and pastoralists are forced to go through the informal route to export livestock to Djibouti. Few fatteners are the only formal exporters in the region. But there is large informal export of live animals to Djibouti through Dawaalee and Asaita markets. This problem is related to poor cattle management system, lack of sufficient fodder and the natural breed of the animals.

Fifthly, traditional institutions that nurtured trust between buyers and sellers across borders are broken. Many livestock traders we interviewed for this study revealed that default on arrear has been recently on rise and costing them a lot of money. We have learned that the negotiation of comprehensive bilateral agreement with Kenya, Somalia, Djibouti and Somaliland governing petty trade between border towns of Ethiopia and these countries is underway and is expected to be finalized by current Ethiopian fiscal year (Yishak Tekaligne, personal communication). This may avoid some of the problems as there will be a due considered administrative or court intervention in such cases. This should, however, be complemented with transforming the traditional exchange system with a legally enforceable contract.

The sixth problem is absence of foreign exchange services to neighboring countries' currencies. Despite the large volume of trade between Ethiopia and its neighbors, Ethiopia does not provide official exchange services to neighboring countries' currencies. The absence of sufficient exchange services restricts the trading activities of Ethiopia with its neighbors and encourages informal/illegal trade. In some border towns, exchange service for neighboring countries' currencies is provided by informal money vendors over the streets. For example in Moyale, Kenyan Shilling is openly exchanged alongside the street by informal money vendors.

The seventh problem is related to [lack of] enforcement of the petty periphery cross border trade. There are many problems that hinder the commencement and smooth running of the PPCBT. The list of items is very old and didn't reflect current needs of the intended beneficiaries. The problem is felt by Ministry of Trade (MoT) also, and it is now collecting information from regions as to the lists of items that the latter think should be included in the upcoming directive. Actually, the Ministry conducted the same survey in 2010, but survey findings were not utilized to amend the directives. The capital ceiling was very restrictive and never updated to go along with the inflation. The latest amendment made is that of the Ethio-Somali Petty Periphery cross-border trade directive which took place in 1997 E.C/2004/05 G.C. The Ethio-Kenya petty trade directive was never amended since its introduction in 1992 E.C/2000/01 G.C. Significant inflation took place after these directives were introduced and that should have been considered. Traders cease to operate petty trade because the maximum value of import/export goods permitted to be exported/imported is significantly low.

The petty traders/traders securing a license to import or export via the periphery trade scheme didn't receive any incentive and they should undergo through all the procedures of customs except the regulatory requirements related with letter of credit and hard currency and duty free exportation of permitted items. Petty traders cannot win the price competition with illegal traders both in local market and neighboring border towns. The number of entries allowed per month is very few, only twice a month. This is the major

source of dissatisfaction among the traders in all regions (Sisay Lemma and Teketel Tesfaye, personal communication). Concerned government authorities are also reluctant to implement the petty trade directives. They feared that the PPCBT would exacerbate the existing informal (illegal) trade and makes controlling difficult because traders may use the license as cover for informal trade and the imported items may also pass beyond the designated areas to the center where it causes competitive disadvantage to formal trades. Moreover, there is lack of horizontal coordination between the ministry of trade and customs authority and lack of vertical coordination among the different tiers of these authorities at federal, regional and zonal and woreda level. The regional states failed to comply with the reporting requirements under the directives (Yishak Tekaligne, personal communication).

## 5. CONCLUSION AND RECOMMENDATION

Cross-border trade has a multitude of advantages especially for towns across borders. Since majority of the participants were women, individuals and small and micro institutions, it contributed towards generation of employment opportunity. It also provides pastoralists and those transiting out of pastoralism with the opportunity of diversifying their livelihood options. Ethiopia has a legal and institutional framework for the regulation of both large and small scale cross-border trade. It has promulgated directives for the regulation of the small scale/petty/ cross-border trade across the Ethio-Kenya, Ethio-Somalia and Ethio-Djibouti borders. There are various legal and practical challenges for engaging in cross-border trade which include absence of foreign exchange services of neighboring countries' currencies, lack of standardized quarantine services, poor breed of livestock, and lack of amendment and enforcement of the petty trade directives. The following are recommendations for improvement.

- ◆ Guarding borders by federal police in collaboration with regional police: This would help to avoid language and communication barriers between border controllers on one hand and traders and pastoralists on the other hand.
- ◆ Amending the cross border trade directives in such a way that the capital requirement are adjusted in line with the inflation and expanding the list of trading items to accommodate the dynamic demands of trade itself and the society living across borders. Moreover, there should be commitment and effective coordination to implement the petty trade law by the Ministry of Trade, ERCA, Regional Trade & Industry Bureaus and Woreda Trade and Industry Offices delegated by respective regional bureaus.
- ◆ Providing modern contract enforcement mechanisms among cross border traders: This might require establishing and strengthening government offices that provide contractual agreement services and creating the awareness about the importance of legally enforceable contracts and collaboration with neighboring country governments.
- ◆ Organizing a consultative workshop for organizations that might, directly or indirectly, affect cross border trade development in Ethiopia such as the Ministry of Trade, Ministry of Agriculture, Ethiopian Revenue and Customs Authority, Ministry of Finance and Economic Development, Federal Police Commission, concerned regional governments, traders, pastoral community leaders, pastoralist associations and cooperatives and delegates from neighboring countries to discuss the issues of livestock trade development, implementation of periphery cross border trade and quarantine service provision in Ethiopia.
- ◆ Providing technical assistance to pastoralists on fodder and cattle management through training and awareness creation campaigns
- ◆ Identifying potential fruit and vegetable producing agro-pastoralist and pastoralists within PRIME operational areas and encourage individual pastoralists, cooperatives and investors to produce and

export fruits and vegetables to neighboring countries, particularly Somalia and Djibouti, and benefit from the nearby large markets for fruits and vegetables.

- ◆ The fact that cross-border trade of Ethiopia with Kenya, Djibouti and Somalia is highly volatile and presents a major risk due to fluctuation in demand/price requires policy and legal intervention from the government through strengthening the provision of insurance services for cross-border traders.
- ◆ One of the problems behind the resistance of traders to make use of the cross-border trade is lack of incentive and the resulting inability to compete with illegal/informal traders. It would be better if duty free importation is allowed with respect to import petty trade in the mandated items. It is known that income from customs duties and taxes applicable on imports will be forgone, but, as it is indicated in the literature review of this research, this will have a tremendous contribution for business expansion and employment creation in the domestic economy and contribute in income generation through widening the tax base of the economy.
- ◆ Providing foreign exchange services to Kenyan Shilling, Somali Shilling and Djibouti Franc so that importers and exporters in Ethiopia and the neighboring countries can easily get currencies for their trading activities and reduce the demand for other hard currencies, such as US dollar, as exchanges can be made with local or neighboring countries' currencies.

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#### **7. ACKNOWLEDGMENT**

We are grateful for Degu Worku, Ahmed Ismael, and Adamu Tefera for their tireless work in the collection of data during the field survey. We also thank Dr. Ahmed, Area Manager for Mercy Corps Moyalle field office, for his kind assistance in selecting enumerators and livestock traders.

## POTENTIALS OF APICULTURE AS ALTERNATIVE LIVELIHOOD IN PASTORAL AND AGRO-PASTORAL AREAS OF GUJI AND BORENA ZONES OF OROMIA REGIONAL STATE

Abebe Ambachew and Lemma Zemedu\*

### EXECUTIVE SUMMARY

*Though the sector has remained underdeveloped, apiculture is one of the promising sectors which can diversify the livelihood options of pastoralists and agro-pastoralists and reduce their vulnerability to food insecurity. . There is no or little information on constraints of apiculture development in the study area since most of the previous agricultural sample surveys excluded wild colonies and beehives kept by forest dwellers as well as pastoralist communities. This study was, therefore, designed to identify apiculture potentials and current roles, as well as point out the production and marketing constraints and prospects of apiary products in pastoral and agro pastoral areas of Guji and Borena Zones. About five sample Woredas were selected and both primary and secondary data were gathered using document review, focus group discussion, key informant interview, and personal observation from relevant sources such as bee keepers (pastoralists), Zone and Woreda pastoral development offices, honey traders and commercial processors, experts, and other actors.*

*The result of this study revealed that not only its potential but also the current role of apiculture was found to be promising as an additional source of income for pastoral and agro pastoral households. Accordingly, thought about one-fourth of the households in the study area have engaged in honey production, near to half of their beehives are empty (without bee colonies) and about 97% of honey production is from traditional beehives and backward methods. Similarly, honey marketing activity is limited and traditional. Regarding the level of participation in the apiary business, honey production and productivity, Guji Zone is better off as compared to Borena Zone. The current practice of watershed management, existence of good vegetation cover, introduction of crop production in the area, and the possibility of organic products with medicinal value are among the opportunities available for apiculture sub-sector development. Whereas, the major challenges hindering its development includes skill gaps, honeybee pests and predators like honey badger and ants, shortage of inputs and accessories, lack of commercial processors, and poor market integration.*

*The study forwarded appropriate policy measures to be taken by different stakeholders, including giving technical training for beekeepers as well as Woreda and Kebele level experts, strengthening the capacity of local suppliers, providing apiary inputs at nearby towns, expanding market opportunities, diversifying hive products, and effectively implement traditional and modern mechanisms to control pests and predators.*

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## 1. INTRODUCTION

Apiculture is an activity of keeping and managing honeybees for various products: honey, beeswax, royal jelly, bee pollen and brood, as well as for pollinating flowering agronomic or tree crops (Ayers, 1992). Ethiopia has a longstanding beekeeping practices that has been an integral part of other agricultural activities (Kassaye, 1990; Legesse, 2014). Ethiopia has immense potential for beekeeping since the country has over 7000 *melliferous* plant serving as forage for bees and huge number of honeybee colonies (MoA and ILRI, 2013). Due to bimodal rains, honey can be harvested at least twice a year. The Central Statistical Authority (CSA) estimate shows that Ethiopia has a potential to produce up to 500,000 thousand tons of honey and 50,000 tons of beeswax per year (CSA, 2010/11).

Given these enormous potential, apiculture is one of the potential sectors that could alleviate poverty situation and reduce vulnerability to food insecurity particularly in rural Ethiopia including pastoral and agro-pastoral areas. However, the subsector is far from realizing its potential as Ethiopia has tapped less than 10% of the honey and wax production potential (MoA and ILRI, 2013). Empirical evidences show that Ethiopia has over ten million bee colonies including those available in forest and crevices which makes the country a leading in Africa and ninth in the world in honey production (Kasaye, 2008; Legesse, 2014). However, the national agricultural sample survey conducted by CSA (2015) only accounts the hived ones found in the rural sedentary areas of the country. Accordingly, the total number of hives was estimated to be 5,885,263 of which the greater part (96.23%) is traditional hives. From these hived colonies, Ethiopia currently produces about 48.7 thousand tons of honey.

Honey is considered as cash crop and only about 10% of the honey produced in the country is consumed by the beekeeping households and the remaining 90% is sold for income generation (Hartman, 2004, cited in Legesse, 2014). Apiculture is playing a significant role not only as a source of off-farm income but also employment. It is estimated that about 1.4 million farm households are keeping bees for income generation and a significant number of people are engaged in related businesses like honey and beeswax collection and trading, and *Tej* (honey wine) making thereby making the subsector very important in job and livelihood creation (MoA and ILRI, 2013).

The situation of the apiculture subsector in our study area is not different from the national picture in terms of its potential. The recent data on beehives population and honey production by regions show that Oromia accounts for over 48.7% of the country's hived bee colonies and 39% of their honey production, followed by Amhara which accounts for about 23.1% of the colonies and 22.8% of the honey production (CSA, 2015). Therefore, developing the apiculture subsector in the region particularly in pastoral areas of Borena and Guji zones (our study areas) will have a paramount importance in creating additional livelihood options.

Tapping the production and marketing potentials, however, requires several interventions acting on the bottlenecks of the subsector. Development intervention will be successful if they are led by empirical studies of this type. There is no or little information on production and marketing practices of bee products in the study area since most of the surveys including those conducted by CSA exclude wild colonies and beehives kept by forest dwellers as well as pastoralist communities. This study was planned to contribute to the existing literature and guide future interventions by documenting information on apiary inputs/accessories supplies, production and marketing practices of bee products, challenges and opportunities to develop the sub sector, and its potential specific to the pastoral and agro-pastoral areas.

More specifically, the objectives of the study were to:

- ♦ assess the production potential of honey and other bee products in the area;
- ♦ identify the type, source, and amount of beehives and other inputs used by the pastoral and agro-pastoral communities;
- ♦ estimate the total production and productivity of different beehives of pastoralists;
- ♦ account the contribution of beekeeping to household income; and
- ♦ assess the market access of pastoralists, traders and local processors of honey.

## 2. METHODOLOGY

This study was conducted in pastoral and agro-pastoral areas of Borena and Guji Zones of Oromia regional state. In consultation with zonal experts, Yabello, Tetele and Moyale *Woredas* from Borena Zone and Liben and Wadera *Woredas* from Guji Zone were purposively selected based on their potential for honey production.

The data collection activity was started by reviewing the documents of zonal and Woreda level Pastoral Development Offices (DPO). In addition to the secondary data, unstructured interview schedules were prepared for each group of respondent and primary data were collected from local and traditional beekeepers, dealers of honeybee products, Woreda and zonal experts, researchers (from Yabello Dryland Research Center), major consumers, honey processors and other production and marketing actors. Personal interview, focus group discussions, and on spot observation of apiary sites were used to collect data. The research team has also observed honey and honey product markets and made further discussion with processors of local beverages such as *Tej* and *Birz* (non-alcoholic local drink) sellers, input manufacturers, local communities, cooperatives and other stakeholders.

The collected data were summarized, descriptively analyzed, and reported in such a way that the overall picture of apiculture in the study area is clearly stated and the above mentioned objectives are addressed. Finally, the report summarized the major findings and forwarded intervention areas for development partners (including PRIME project), entrepreneurs and government actors to further transform apiculture in the pastoral and agro pastoral areas.

## 3. RESULTS AND DISCUSSION

### 3.1. Potentials of Apiculture and its Current Role in the Livelihood of Pastoralists

#### 3.1.1. Apiculture potentials of the study area

The potentials of apiculture for a given areas can be determined on the basis of different parameters including landscape and altitude, forage availability (vegetation cover and composition), water availability, temperature and rain fall, and availability of bee colonies, among others. When we evaluated the study area based on these parameters, it leads to a general conclusion that the area has a good apiculture potential. Most of the districts located in highlands of the two zones included in the study have a higher potential than their lowland counterparts as the vegetation cover of such area remains green throughout the year and creates more favorable condition for beekeeping through provision of both bee forage and water. Some of commonly available bee forage species include *Acacia breviopica*, *Acacia dropanolium*, *A. Mellifera*, *A. nubica*, *A. reficiens*, *Commiphora African*, *Dichrosteelysi* and *Dober glabera* and others which were given by local names.



Among the two study zones, Guji zone was generally found to have a higher apiculture potential than Borena zone owing to availability of bee forge and water. This was confirmed by observations of the agroecology of the environment as well as the current honey production data presented in the subsequent sections. The pastoral and agro pastoral farming system of the area less threatened the good vegetation cover and the existence of diverse types of bee flora species made the forage availability easier especially in the wet seasons.

Even though the area is generally moisture stress, existence of some rivers (where the Dawa and Genale rivers are the notable ones) and artificial ponds respond for water requirement to beekeeping practice. This made apiculture a potential income source for pastoralists in the study area. The negligible amount of water which is directly consumed by bee colonies makes the water shortage problem less constraining as long as flowers and related forages are available. Of the apiculture potential measures listed above, there was no as abundant as bee colonies in the study area. There were excess bee colonies to the extent that colonies enter to school roofs, boxes and holes of electric poles. If used properly, these can open up additional livelihood opportunities for income constrained pastoralists.

In order to facilitate possible intervention to be made by any other interested development partner, this study identified specific Woredas and Kebeles with relative potentials for beekeeping practices. As it can be seen in Table 1, Digdawa, Melka Soda, Yabello, Teltele, and Arero were among the Woredas of Borena zone with a good potential while Wadera, Liben, and Gorodola Woredas were with top potential in Guji zone. Again, the most suitable Kebeles in each sample Woredas for honey production were documented and presented in Table 1. These areas were the leading honey producing areas up to the study period.

Table 1. Apiculture Potential Woredas and Kebeles of the study area

Zone	Potential Woredas in PRIME operation area	Sample Woredas surveyed	Potential Kebeles in the sample Woredas
Borena	Digdawa, Melka Soda, Yabello, Teltele, and Arero	Yabello	Obda, Yubdo, Chulkasa, Elweye, Aleri, Cher, Bildim, Tolhawayu, and Harewoyu
		Teltele	Mannaro, Oboki, Orbate, Elkune, Saritte, Dibe-Gayyo, Bule-Korma, Gandelile, Hadhoo, and Brindar
		Moyale	Tuka, Argenie, Mudi
Guji	Wadera, liben and Gorodola	Liben	Kalada, Algie, Bulbul, Kobadi, Hardot
		Wadera	Chelo, Gerbi, Kino, Tulem

Source: own survey data, 2015.

### 3.1.2. Contribution of revenue from apiculture to households income

It is clear that livestock is the main source of livelihood in pastoral and agro-pastoral areas where this assessment was undertaken. In the research sites, the source of income for pastoralists was less diversified and unreliable due to the recurrent drought. Given this problem, the role of apiculture was found to be significant as an additional source of income for pastoral and agro pastoral households. The sale of crude honey was widely used to satisfy the immediate cash demand of beekeepers in both Guji and Borena zones.

In Borena zone, for instance, evidences obtained from the *Woredas* showed that apiculture contributes up to 10% of the households' income. Income from sales of honey partly satisfied the cash demand of households which was usually spent to purchase non-farm goods. In boarder districts like Moyale, petty trading was more important than honey production to support the livelihood of pastoralists and the role of apiculture was still negligible.

Like that of its potential, the contribution of honey production for household income was higher in Guji zone than in Borena. Even if there was no disaggregated data showing the income share of apiculture at Zone and district levels, evidences in some surveyed Kebeles, for instance in Tulem kebele of Wadera *Woreda*, revealed that 20 to 30 percent of household income attributes to apiculture. Almost in all districts, beekeeping was practiced by individual farmers while cooperatives organized for honey business were not effective up to the time of data collection. The poor performance of cooperatives in the survey areas was mainly attributed to the lack of trust on the organizers of the cooperatives. Hence, assistance of government is highly required to improve apiculture sector in terms of cooperative production and marketing.

### *3.1.3. Proportion of households involved in beekeeping practice*

In the study areas, considerable numbers of households were found to engage in honey production. Based on secondary data collected from each *Woreda* Pastoral Development Office, a total of 17,989 households in the sample *Woredas* owned beehives and practice beekeeping the time this data was generated. This participation rate demonstrated that about 26%, i.e., more than one-fourth, of the households residing in the study area produced honey (Table 2).

The level of involvement of households in this subsector was as differed as their potential. The participation of households in apiculture was by far higher in districts of Guji Zone than Borena zone. For instance, about 79% of households in Wadera district of Guji zone owned beehives. If we exclude the urban households of the *Woreda*, this figure goes higher confirming that almost all rural households owned beehives and participated in honey production. Kebele level data directly collected during this survey confirmed that the households' participation in apiculture for selected potential Kebeles was much higher than their *Woreda*'s average. Similarly, for Liben *Woreda* even if the *Woreda* pastoral development office expert estimated participation rate to be about 25%, direct assessment in the sample Kebeles of Kalada and Hardot revealed a higher rate, i.e. estimated rate of 95% and 80% respectively. Of the sample *Woredas* surveyed in Borena Zone, Teltele was found to be with higher number of households (16%) engaged in honey production, though most of the practitioners did this business traditionally (Table 2).

Table 2. Participation rate of households in honey production for sample Woredas

No	Sample Woreda	Number of HH in the Woreda	Number of HHs with bee hive type	%age of households with beehives
1	Yabello	18,183	1,192	7%
2	Teltele	15,748	2,495	16%
3	Moyale	7,712	376	5%
4	Liben	14,539	3,635	25%
5	Wadera	13,104	10,291	79%
	Total	69,286	17,989	26%

Source: own computation from the respective Woreda's data, 2015.

### 3.2. Quantity of Beehives Owned by Households

Understanding the types and amount of beehives used by pastoral households to produce, honey is believed to be important to judge both the potential as well as the contribution of the sub-sector for their livelihood. Data on the number and types of beehives owned by pastoral and agro-pastoral households in both Borena and Guji Zones were analyzed and presented in Table 3 and Table 4. As it is shown in these tables, there were a total of 109,206 and 122,074 beehives in 10 and 5 pastoral Woredas of Borena and Guji Zones, respectively. Dugda Dawa and Teltele were found to have the highest numbers of hives among the pastoral Woredas in Borena zone while Gorodola and Wadera ranked top in their beehives population in Guji Zone.

In order to make comparison between the two zones on the basis of quantity of beehives, it is appropriate to take the number of Woredas each of them constitutes. To this end, the beehive population per Woreda was computed and presented in Table 5 where the difference between the two zones is more visible. Accordingly, the average number of beehives available in each Woreda of Guji Zone was about 24,415. This was more than double of the average Woreda beehives available in Borena Zone (Table 5). This again confirmed that honey production was more common in Guji than Borena Zone with an average of 15,419 beehives in each Woreda. These figures are generally encouraging to expand honey business in the areas as significant amount of hive products can be used to diversify the income consumption items of households.

Table 3. Quantity of beehives in 10 pastoral Woredas of Borena Zone (2013/14)

S.No	Name of the Woreda	Number of Beehives			Total
		Traditional	Transitional	Modern	
1	Dugda dawa	45,750	205	26	45,981
2	Yabello	7,684	459	246	8,389
3	Teltele	33,450	303	95	33,848
4	Dire	1,727	41	148	1,916
5	Moyale	1,439	81	1	1,521
6	Dilo	272	0	0	272
7	Miyo	1,860	58	33	1,951
8	Melka soda	6,200	0	4	6,204
9	Arero	5,650	2,892	12	8,554
10	Hhas	558	12	0	570
	Total	104,590 (95.8%)	4,051 (3.7%)	565 (0.5%)	109,206 (100%)

Source: Borena zone and Moyale Woreda (for Moyale data) Pastoral development offices.

Table 4. Quantity of beehives in pastoral Woredas of Guji Zone for the year 2014/15

S. No	Name of the Woreda	Number of Beehives			Total
		Traditional	Transitional	Modern	
1	Liben	19,300	178	92	19,570
2	Girja	24,270	320	70	24,660
3	Gorodola	45,965	39	31	46,035
4	Sababoru	5,000	140	0	5,140
5	Wadera	26,298	81	290	26,669
	Total	120,833(99%)	758(0.6%)	483(0.4%)	122,074(100%)

Source: Guji Zone pastoral development office.

Table 5. Average Beehives holding per pastoral Woreda disaggregated by beehive type and zone

Zone	Traditional	Transitional	Modern	Total
Guji	24,166.6	151.6	96.6	24,414.8
Borena	10,459.0	405.1	56.5	10,920.6
Total	15,028.2	320.6	69.9	15,418.7

Source: own computation from the survey data.

Three types of beehives, namely, modern, transitional (Kenyan top bar), and traditional hives were used by beekeepers in the study area. The assessment revealed that of the total beehives available, about 96% and 99% of them were found to be traditional in the Borena and Guji zones, respectively. This showed us that transitional and modern beehives together have a share of only 4% in Borena and 1% in Guji.

While there was no any difference among Woredas in Guji Zone in terms of better beehives (modern and transitional) holding, some differences were observed in Borena Zone in this respect. As it can be computed from Table 3, Arero and Dire Woredas were found to have modern and transitional beehives

accounting about 34% and 10%, respectively. In this regard, Borena zone was relatively better off as compared with Guji. The major reason for this was that there were higher numbers of NGOs working in Borena than in Guji and much of the transitional and modern beehives distributed throughout the Zone were attributed to their intervention. The rest of modern hives were mostly distributed for pastoral training centers (PTC) of each Kebele for demonstration purpose. There was also an emerging idea to distribute modern beehives to pastoral and agro pastoral households as a strategic intervention for productive safety net program (PSNP) rather than paying in cash for the work pastoralist do.

In addition to the zonal and district level analysis of the beehives holding, the mean households' beehives holding was also estimated for five pastoral Woredas which were deeply assessed in this survey. As it can be seen in Table 6, a typical household or beekeeper owned, on average, five beehives. Beekeepers in Teltele had the highest average number of hives (Table 6). This was also confirmed during the field observation in the Woreda where it was much common to get a number of traditional beehives hanged on tree branches.

In some *Kebeles* of the sample Woreda, the researchers got individuals owning even more than 100 traditional beehives. Having 30-50 hives was much common in many potential *Kebeles* of both Guji and Borena Zones. Yet these were mostly traditional beehives which were less productive than the modern and transitional ones.

Table 6. Beehive holding per pastoral household in the sample Woredas of Guji and Borena Zones

S.No	Sample Woreda	Total Number of beehives	Number of Households with beehives	Average number of beehives
1	Yabello	8,389	1,192	7.0
2	Teltele	33,848	2,495	13.6
3	Moyale	1,521	376	4.0
4	Liben	19,570	3,635	5.4
5	Wadera	26,669	10,291	2.6
	Total	89,997	17,989	5.0

On top of all, about half of the beehives reported by Zone and Woreda pastoral development office and also depicted in the above tables were empty (without bee colonies). Even in highest potential Woreda (Wadera), where bee forage was relatively abundant, only 14,400 (53%) of the total 26,669 beehives were with bee colonies during the time of data collection while the rest were empty. The figure may be worse than this in other Woredas, especially in Borena Zone.

The study also explored a number of reasons for this. First, most of the modern hives distributed by NGOs were given for beekeepers without the complementary accessories like wax foundation sheet. This made much of the modern hives, which is wider, less attractive for bee colonies. The inexistence of queen excluder was also the other factor contributed for the evacuation of bee colonies from beehives. Secondly, the type of bee colony in the area is migratory by nature. It migrates from place to place especially in dry season for search of forage. The exposure of the apiary site for the honey bee pests is the other contributing factor for beehives to remain without bee colony.

### 3.3. Description of Apiary Sites

It was found that almost all pastoralists that used traditional beehives kept their bee hives hanging on trees branches. While, modern bee hives and few of traditional and transitional hives were placed in the garden of their homesteads. Some bee producers made apiary sites away from home not to disturb domestic animals and the family and to get adequate space. In contrary, in some places, keeping beehives in forest areas attracted thieves and wild animals like Honey badger. Some other individuals in the study area has apiary site fenced with wire and cleaned very well to reduce predators. Generally, most of the apiary sites considered in this study were not properly constructed.



Figure 1. Apiary sites at Yubdo, Tulem, and Elkune Kebeles (left to right)

### 3.4. Source and Types of Apiary Inputs and Accessories

#### 3.4.1. Current sources of beehives and other accessories

Apiary inputs include hives of different type (modern, transitional, traditional), smokers, honey extractor, queen excluder, wire for apiary fence, and complete apiary person clothes. Water, bee forage and other supplementary food can also be considered as apiary inputs.

The assessment result revealed that traditional bee hives were prepared by pastoralists themselves from local materials (trees). Often, traditional hives were not available in the market. Some pastoralists, however, responded that they were prevented from cutting trees for beehive preparation. Almost all pastoralists with traditional beehives did not have access to other accessories of apiary site. Honey harvesting and inspection was very difficult as traditional smoking on hanged bee hives on branches of big trees frequently cause fall from trees and resulting in physical injuries. Poor inspection and burning of bees by fire during harvesting from traditional hives were among reasons for poor productivity.

Modern and transitional beehives were distributed to only few households by NGOs in the area. However, as accessories to such beehives were not provided, majority of the beehives distributed to the pastoralists were not functional. The missing accessories included wax foundation sheet, smoker, queen excluder, complete hivers person clothes, fences, etc.

Modern beehives available in the study area were distributed by SOS Sahel in Yabello Woreda, GOAL in Teltele Woreda, COPI in Guji zone, World Vision and Save the Children in Moyale Woreda and bureau of agriculture for pastoral training centers (PTC). These hives were prepared at Shahemene, Assela, and Ziway by Small and Micro Enterprises (SME) in the districts (eg. Yidnck enterprise in Negele, TVETs in Yabello, and Holeta Research Center (Table 7)). Acute shortage of modern beehive and its accessories including honey extractor were experienced in most Kebeles and Woredas surveyed though pastoralists showed high demand for such modern technologies for improving their honey productivity.

However, some of these beehives were destroyed by internal conflicts in the study area, more specifically in Guji zone.

Table 7. Sources of modern and transitional beehives distributed to beekeepers

No	Source of modern/transitional bee hives	Number of hives supplied	Where the hives are prepared?	Distributed to which district?
1	SoS Sahel	few hives to cooperatives	Shahsemene, Asela, Ziway	Yabello
2	GOAL Ethiopia	126	Shahsemene, Asela, Ziway	Teltele
3	Save the children	76	Shashemene and SME in Liben	Moyale
4	FAO	4 kebeles	Shashemene and SME in Liben	Moyale
5	COPI	Few individuals	SME in Negele	Liben
6	District Pastoralist office	2 per Pastoral Training Center	Shashemene, SME, TVET	Wadera, Moyale, Liben and Yabello

Source: own survey, 2015.

#### 3.4.2. Future potential suppliers of accessories

In the past, modern bee hives were accessed from Shashemene, Asela, Ziway, and Holeta. At present, TVETs and small and micro enterprises (SME) located in the study area have shown their potential to be a primary source of modern and transitional beehive, if opportunities are given to them. For instance, SMEs from Moyale and Negele town took contract and delivered modern hives in a short period of time. TVET College in Yabello also showed the sample beehives in their workshop and agreed to provide similar products in mass and offer trainings to SMEs in Yabello town, if assistance is given.

As far as the cost of production is concerned, SMEs and TVETs revealed that they can produce modern beehive with one super on average at cost of 1200 Ethiopian Birr, where the increase in price is mainly related to rise in cost of raw material mainly timber. There was no significant difference between prices of such hives brought from other areas and those produced locally. However, giving the opportunity to the local producers can have additional advantages of creating employment opportunities and sustaining supply of hives and potentially other accessories in the study area.

In addition to the hives and related accessories, honey production depends on the availability of bee forage and water. When this research was carried out, there was no supply of artificial bee forages produced in the apiary sites. Most of the traditional beehives were placed in the middle of forest for easy access of bee forage. To bridge this gap, during dry season, traditional beekeepers supply locally prepared food like grinded roasted beans (*Shiro*), sugar and water to their colonies. There were cases where colonies abscond from the modern and traditional beehives. This fluctuation in bee colony behavior was mainly related to bee forage and water. Hence, any effort that provides flowers and water to bees in the region would improve honey quality and productivity.

### 3.5. Apiary Products, Level of Production and Productivity

#### 3.5.1. Types of bee products produced in the area

There is a possibility of producing various types of apiary products in the practice of modern apiculture. Despite this possibility, only two types of products - honey and beeswax - were being

produced by beekeepers and honey processors in the study area. Commercialization of other high value bee products such as pollen, propolis and bee venom was non-existent. Crude honey was the single most important product supplied by pastoral households. This may have a color of red, white, and sometimes black depending on the types of forage available. Processors and honey traders who buy crude honey from beekeepers usually do simple and manual purification process.

There were only two small commercial processors located at Yabello town who pack semi-purified honey and make purified wax for sale. The other processors were local drink (*Tej* and *Birz*) makers that use crude honey for it and also produce crude wax (*Sefe*) as by-product of these local beverages. Some of these *Tej* and *Birz* makers provided their crude wax for sale while some others donate it to churches or dispose it. Generally, the types of products being produced were limited. In the study area, no one was found to practice queen rearing and other possible apiary products.



Figure 2. Ashebir and his wife Konjit- traditionally processing crude honey in to pure honey and beeswax in Yabello town

### 3.5.2. Level of honey production in the study area

Empirical evidences show that Ethiopia is a number one producer of apiary products in Africa. In this context, the level of honey production in the study area was also assessed. In this effort, secondary data on level of production for the last three years was obtained only for Guji zone and presented in Table 8. Accordingly, the level of honey production is increasing overtime and the year 2013/14 was raised as a favorable season for apiculture (because of good rain) which resulted in a huge jump in production. Recently, Girja and Wadera Woredas were taken the lead in volume of honey production (Table 8). As far as the Borena Zone is concerned, production data were obtained only for Yabello Woreda where honey production was estimated to be 48,125 – 65,911 Kg per annum (Yabelo Woreda PDO, 2015).



Table 8. Amount of honey production in Kg in Guji zone for the last three years

No	Name of the Woreda	Year		
		2011/12	2012/13	2013/14
1	Liben	14,160	16,515	37,131
2	Girja	11,970	77,360	241,961
3	Gorodola	13,617	19,245	75,746
4	Sababoru	13,068	18,606	63,940
5	Wadera	27,120	30,515	126,208
	Total	79,935	162,241	544,986

Source: *Guji Zone PDO*.

### 3.5.3. Productivity of beehives

Even if the literature suggests the average productivity of each hive type, this study pointed out the actual productivity of beehives owned by pastoral households. The survey result of the sample Woredas on productivity per round in Kg was summarized and presented in Table 9. As beekeepers commonly harvest honey twice a year from each beehive, the annual production would double in figures. Generally, the productivity of beehives depends on beehive size and type. Modern beehives are more productive than others and the transitional ones are better than the traditional beehives. However, the productivity of each type of beehives is different from place to place. For instance, the productivity of modern hives go as high as 40 Kgs in one round harvest in some areas like Wadera while it goes down to 15 Kgs in some others like Teltele. Similar variation could be noted again in transitional hives (Table 9).

Table 9. Productivity per beehive per single harvest in kg

	Sample Woreda	Traditional (kg)	Transitional (kg)	Modern (kg)
1	Yabello	8	16 - 17	32
2	Teltele	5 - 6	10 - 15	15 - 20
3	Moyale	Up to 30 (big size)	28 - 30	30 - 35
4	Liben	5	15	25
5	Wadera	6	20	40

Source: *own survey, 2015*.

Since there is no standardized size for it, big traditional hives may yield as much as 30 Kgs of honey per single harvest. Normally, the productivity of 5-8 Kg for traditional beehive is more common. We understood that in many areas, especially in Borena Zone, the difference among the three types of beehives was negligible. As a result, there were even individuals who perceive modern beehive not as much productive. Poor hive management skills of the beekeepers and the incompleteness of the modern and transitional hives (lack of accessories and other complements) made it less productive and caused negligible difference between the modern and traditional types. In a situation where the preconditions of modern beehives were fulfilled, the inherent productivity difference among these types of beehives was visible.

**3.6. Marketing, Processing and Market Places of Hive Products**

**3.6.1. Price of crude and locally refined honey**

The study area is characterized by good potential for honey production, limited apiary inputs, few processors of honey into local beverages and few traders of honey. Honey was the main product of apiculture in the areas as there were limited numbers of processors that produce bee wax. The local community started using honey with bread, for women during pregnancy and post delivery period, for medicinal purpose and for preparing local beverage at home during holidays and for some other ceremonies where local drinks are required.

Pastoralists complain about low price and absence of proper market places for honey. Honey is normally marketed not on the basis of kilogram or other standard measures, rather using locally available oil can and powder detergent buckets with an estimated capacity of 5 and 15 kgs. There was variation in prices based on color of honey resulted from type of trees and flowers that bee colonies feed on. There was also variation based on the quality, whether locally refined or not. Market price of honey was about 150 to 200 Birr per 5 kgs. However, during dry season a kilogram of honey could be sold at 50 to 55 Birr. Honey price increased from about 170 Birr per 5kg two years ago to 200-300 Birr per 5kg bucket at present in Yabello and Teltele, where buyers of honey came from Konso and Arbaminch areas. These local measurement were converted into kilograms and honey prices of the study were summarized as follows.

Table 10. Prices of honey per Kg in the study area

Color	Honey Type	
	Unrefined with comb	Locally Refined
White	40-70 birr/kg	90 birr/kg
Red	30- 40 birr/kg	60 birr/kg
Black	20-25 birr/kg	-

Honey refined with modern honey extractor was sold at price of 100 Birr per 850 gm container in Wadera district. In the nearby districts like Kofele town in Arsi Zone, the price rises to Birr 150 per kg. In Yabello town also price of refined honey with modern extractor is sold at 140 Birr/kg. Red and unrefined honey at price of 40 to 50 Birr per kg is preferred for *Birz* preparation. Raw wax (*sefef*) is sold for 15- 20 Birr per kg in Negele and 30 to 40 Birr per kg in Yabello.

**3.6.2. Processors of honey into local beverages**

There are few local beverages (*Birz*, *Karibo* and *Tej*) producers in each towns of the southern cluster. These people mainly sell their product to low income people and the pastoralists. The price of *Tej* per liter was 8 to 10 Birr and *Birz* at up to 12 birr per liter. The quality of these local drinks, as measured by ingredients, was so poor since consumers cannot afford higher prices set for quality drinks with more pure honey. The beverages prepared for commercial purpose were mainly made up of small amount of honey and other ingredients like sugar and color flavors. Hence, such drinks were currently considered as poor persons drink.

Ironically, local beverage processor in the area mentioned that they usually purchase so called *Gojjam's* honey which is usually supplied by their clients from Addis and Hageremariam (*Bule Hora*), a neighboring highland district in Borena Zone. The secret of purchasing the so called

Gojjam's honey is due to its red color and taste that are preferred by local beverage customers. In terms of purity, they appreciated the local one except its poor harvesting, but not cost effective to use it for local beverage (*Tej* or *Birz*) preparation as its power of honey aroma in the local beverages is weaker than that of the so called Gojjam's honey. In preparation of local beverages, the processors use more sugar and less honey in most cases. Hence, the demand of local honey for local beverage preparation is limited both in Borena and Guji zones.

Processors at Yabello and Negele were interested to add value on local honey if they get assistance from government or development partners. These processors can be potential traders of quality honey if they get access to extractors. There was only one trader of honey in Yabello town. They were happy if they could produce quality local beverages from honey and supply it to big hotels to reach the high income consumers. But, the market linkage with hotels and other better-off people is very weak.

### 3.6.3. Honey trading in the study area

The number of traders involved in honey trading was very few and ranged from one to three per district. Supply of honey also depends on the availability of bee forage and water, which varies with season. Consumption of honey was also found to be better during holidays when consumers prepare local drinks at home.

There was an indicator of outflow of honey from the study districts. From Elweya (Yabello) and Teltele, it was common to get honey traders coming from Konso and Arbaminich. In Guji Zone, there were traders from Shakiso and Adola. Unlike other districts of the study areas, there was a market place dedicated for honey in Elweya town market. Pastoralists from Liben district, Hardot kebele, mentioned that the honey traders in Negele mistreat producers and set lower price. The pastoralists mentioned that they did not have any other option than taking the predatory price given by the few traders, who had their own honey shop in Negele town. Honey market and selling prices depend on the season. Honey was reported to be expensive during dry season -which in turn affect the supply of honey.

In general, honey market was traditional and neglected. Given the natural potential in the area with little intervention, it seemed promising to invest in honey business, especially in Guji zone due to relatively better availability of water and bee forage.

## 3.7. Opportunities and Challenges of Apiculture Development

### 3.7.1. Opportunities

The opportunities for apiculture development available in the study areas were identified by this assessment. The major ones were:

**Watershed management initiative:** there was a huge watershed management activities conducted across the country including in the study area. There was also a strong belief by the government to integrate this activity with animal fattening and beekeeping businesses. This was becoming one of the priority areas to employ the rural unemployed youths. As a result, all the necessary support can be given by the government to improve the sub-sector.

**High potential:** The existence of excess bee colonies coupled with a relatively good vegetation cover can help do apary business easily.

**Organic products:** Borena and Guji areas are known for natural forests which were used for bee forage. Honey produced in this area was believed to have medicinal value associated with wide variety of

bee forage and its organic nature. This endorsement by consumers can be taken as a golden opportunity for marketing.

**Introduction of crop production:** There is a direction by the government to change the livelihood of pastoralist in to agro-pastoral through introducing mixed agriculture. As a result, haricot bean and other crops production activity was already started especially in some districts of Guji zone. This increased the forage (flower) availability and thus boosts honey production.

**Infrastructural expansion:** Many of the pastoral and high potential Kebeles were connected by rural road net work. Nowadays, it becomes easier to drive across these Kebeles and do production and marketing activities. The expansion of communication infrastructure like mobile network was also another opportunity to facilitate marketing.

### 3.7.2. Challenges

The major challenges hindering the development of apiculture in the study area were pinpointed as follows.

**Skill gap:** the number one problem available in all the areas is lack of necessary skills to operate apiary business. This is equally important limitation for bee keepers (pastoralists), woreda experts, and development agents (DAs) working in the Kebeles. During the time of data collection, there wasn't a single expert specialized in apiculture; most of the employees supposed to assist beekeepers were generalists who lack specific skill on the use of modern accessories and other practices. Cancellation of the three months' specialty training offered for generalists at Holeta Agricultural Research Center and staff turnovers are blamed for this enormous skill gap. The inadequacy of training module distributed by MoA to Woreda experts was also raised as contributing factor for the problem.

**Honey bee pest and predators:** Sub-tropical climate of the country made the land not only favorable for bees but also for different honeybee pests and predators (Desalegn, 2001, cited in Ejigu *et al.*, 2009). The most devastating pests or predators damaging honeybee colonies are ants and honey badger. In some instances, beetle and bee-eater birds affect bee colonics. A number of local coping mechanisms were implemented by beekeepers to minimize the risk of these pests. Putting the beehives on the barrel and on bed with long metal stanchion, fencing the apiary site, setting the cassette rope/cord around the apiary site, tie dog at the apiary site, and covering the trunk of the tree on which beehives are placed with iron sheet are among the local mechanisms used to control honey badger in the study area. Alcohol and ash were also used to minimize ants' attack. Despite all these efforts, honeybee pests and predators remained the number one problem for beekeepers.



Figure 3. Local means to protect beehives from Honey bee pest and predators in the study area

**Shortage of inputs and accessories:** many beekeepers do not have the necessary modern inputs and accessories. Most of the modern beehives were also observed to be non-functional mainly due to shortage of wax foundation sheet, lack of queen excluder as the bee species in the area was of migratory type (*Apis Melifera sculeta*). Added were limited availability of fences that prevent honey badger and other predators, shortage of complete clothes for apiary person, and rare honey extractors. Due to absence of honey extractors, most of honey is sold in crude form. The absence of private accessories providers heightens the problem as the provision of these is through government offices (Woreda offices) which suffer from logistic and bureaucratic problems.

**Tribal conflict:** the conflicts of different tribal groups end up by destroying beehives which were usually located far from the residences of owners. Even if there was strong social condemnation of such act, sometimes beehives were stolen by thieves since the apiary site was not well fenced.

**Water problem:** given the area's moisture stress, there were no adequate flowers during the long dry season, nor water around the apiary site for bees' consumption. This was particularly true in some districts of Borena zone where beekeepers served water by bucket. On one of our focus group discussions in Elkune (Teltele Woreda), the participants complained of wild bee's competition with their own colony in accessing supplied water.

**Lack of processors and poor market integration:** in almost all districts there is no well-organized commercial honey processor. As a result, the honey provided to the market is crude and lacks quality.

There was also a market access problem in some remote Kebeles though this was not a problem in urban centers and areas near to main roads. Lack of market information is also another problem. Even, the periodic market assessment of the government conducted by the central statistical authority did not include hive products in the lists of items considered in its surveys.

**Insecticide spray:** In some areas of Guji zone, for example in Wadera Woreda, where crop production was practiced, the use of pesticides and insecticides was destroying bee colonies. The use of such chemicals has also a risk of poisoning hive products. Though the expansion of crop production should be encouraged, the fight against insects and pests should be done in such a way that it minimizes such environmental pollutions.

#### 4. CONCLUSION AND RECOMMENDATIONS

The study area was proved to have immense potential of apiculture especially in the Guji zone. Thus, it seemed promising to invest in honey business in the area. At the time of data collection, more than one-fourth of the pastoral households practiced beekeeping in the sample *Woredas*, on average, and 10% to 20% of their income is attributed to apiculture. But, more than 97% of the beehives are traditional. Moreover, about half of the beehives available in the surveyed area were found to be empty due to lack of beekeeping skills and accessories.

- ◆ There was no any private dealer in the areas who supplied accessories like modern beehives to the local market. Therefore, the local TVET colleges and private enterprises should be given the opportunity to produce.
- ◆ Crude honey was the single most important product supplied by pastoral households and there was no well organized modern enterprise that processes honey products. Therefore, any development partners interested in the sector should focus on diversifying apiary products and supporting further processing of the products. In order to facilitate market integration, preparing common forums like expo on apiary business and bringing all stakeholders together may be an important strategy.
- ◆ Honey market in the study area was traditional and small in terms of volume of transaction. This is because most of rural Kebeles were located far from the district market centers where honey marketing was taken place and thus majority of the produces may be consumed at home. There were only few honey traders in each district who mostly set honey prices when they purchase it from small rural beekeepers. The local government should allocate or define spaces for honey market so that small producers can have multiple options to sell their products at a reasonable price.
- ◆ The current practice of watershed management, existence of good vegetation cover, the possibility of organic products that was believed to have medicinal value, and infrastructural expansion were among the opportunities available for apiculture development. Whereas, the major challenges hindering its development includes skill gap, the attack of honey bee pests and predators like honey badger and ants, shortage of inputs and accessories, and poor market integration, and application of chemicals like pesticides and insecticides.
- ◆ Lack of knowledge and skill of practicing modern beekeeping was a problem of everyone in the area. Therefore, practical trainings should be given to Zone and Woreda level apiculture experts as well as some selected beekeepers and processors. Once the training of trainers is given for these groups, they can also train other beekeepers in their locality.
- ◆ In addition to local coping mechanisms being practiced by beekeepers to tackle the problem of honey bee pests and predators, it is also advisable to keep the apiary site clean, filling water at the

bottom round of the metal/wood stanchion where the hives are placed so that ants cannot bypass the water, and not only fencing the site but also constructing the floor by cement concrete to blocks honey badgers from digging down and bypassing fences.

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## 6. ACKNOWLEDGMENT

We are highly indebted to PRIME project and Haramaya University for their financial and material support, respectively. Mr. Adamu Tefera, who was a field officer of HU-PRIME, and Mr. Genemo Unkie, a Mercy Corps staff at Negelle, deserve special thanks for their unreserved effort in facilitating the field works and involved in the data collection.

## PRODUCTION POTENTIAL, OPPORTUNITIES AND CHALLENGES OF FISHERY PRACTICES IN GUJI AND LIBEN ZONES, SOUTHERN ETHIOPIA

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### EXECUTIVE SUMMARY

*Fish plays an important role in the world's food system. In the rich world, it is increasingly seen as healthy luxury food, but in many developing countries, it still constitutes an important part of the staple diet. In Ethiopia, the demands for the product is increasing and there is a huge potential for fishery economic activities but there are a lot of constraints in the production.*

*In the same token, despite the existence of fishery resources in Guji Zone of Oromia and Liben zone of Ethiopian Somali regional state following the Genale and Dawa river basin, the harvesting and utilization of the fish for meal and marketing is very low. This assessment was aimed to identify the production potential, challenges and opportunities of fishery market from the supply and demand sides for improving the market system.*

*From rapid assessment on three weredas of Guji zone (viz; Liben, Gorodola and Melkaguba), two weredas of Liben zone of Ethiopian Somali Regional State (viz; Filtu and Dollo) and two weredas of Borena zone (Viz; Miyo and Teltele), it was understood that the sector is underdeveloped. There are various reasons for this underdevelopment; lack of production skill and technical knowhow, weak market linkage and limited market information, logistic and working capital constraints of producers are some of the identified reasons. Besides, the government commitment is very weak, lack of grid electrification, the cooperatives are not well structured and well-functioning, and coordination failure among actors in the subsector are some of the reasons among others which contribute to the low level of development of the sector in the area. However, if effort is exerted to rectify the above problems, the area has a huge potential of fish in its water resources. The two big rivers viz, Dawa and Genale together with Sokora and Awata cross the area that creates a fertile ground to develop fishery economic activity as an alternative livelihood for the dwellers of the area including pastoralists. In addition to this huge potential, the assessment revealed that there are also various opportunities available that make the sector promising. These are willingness of youths to join the sector, willingness of the society to mobilize the ever increasing price of meat. It was also indicated that the society doesn't have cultural or religious prohibition for consumption of fish, and the government has interest for the sector.*

*Based on the finding, recommendations were also made. Improving the market system, awareness creation for production and consumption of fish, provision or financing of equipment like refrigerator, hook and net, supporting producers to open market outlets*

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*in the town, strengthening the existing cooperatives and establish new ones, and adopting experiences of other areas like Ziway and Hawassa were some of the recommendations made to enhance the productivity of fishery.*

## 1. INTRODUCTION

Fish plays an important role in the world's food system. In the rich world, it is increasingly seen as a healthy luxury food, but, in many developing countries, it still constitutes an important part of the staple diet. Ethiopia is not an exception in this regard. Due to its nutritional values and the population pressure, the demand for fishery product is ever increasing. According to Valdimarsson (2007), it is expected that fish consumption will go up in both developed and developing countries alike. Similarly, FAO estimates that the total food production in the world measured on a per capita basis has also been steadily increasing over the last 30 years, averaging an annual growth rate of 1.2% over the last decade. This growth has been much higher in developing countries than developed countries (Ibid, 2007).

In Ethiopia too, the demand for fish products also increases and there is a huge potential for the products of fishery economic activities. Despite different limitations of the sector, empirical estimates put the country's total fish potential to 51,500 tons per year, with a current exploitation of 30% only. This leaves considerable potential for expansion (Sileshi, 2010). Assefa (2014) also found out that there are 180 different species of fish in Ethiopia and 30 of those are native to the country. The total area of the lakes and reservoirs stands at about 7000 to 8000 km<sup>2</sup> and the important rivers stretch over 7000 km in the country.

The available technologies are capable of resolving the problems of fisheries production in the country. However, the level of exploitation and contributions of fishery to food security and growth in the country is minimal. According to Alemu *et al.*, (2014), riparian fisheries in eastern and southern Africa tend to be small-scale, and labor intensive. Fishery practices have received relatively little attention because they have limited commercial values compared to marine and lacustrine fisheries. Oromia and Ethiopian Somali Regional States in general and PRIME intervention areas in particular are not exceptional in this regard.

Despite the existence of fishery resources in Guji Zone of Oromia and Liben zone of Ethiopian Somali following the Genale and Dawa river basin, the harvesting and utilization of fish for meal and marketing is very low. As preliminary information gathered from Guji Zone Pastoral Development Office, there were some primary cooperatives organized on harvesting and marketing of fish products in Gorodola and Liben *woredas* of Guji zone. However, the supply system by both cooperatives and individual fish collecting traders wasn't functioning well and their activities were stagnant. The evidence around Negelle-Borana town and the surrounding areas indicated that the community has high demand for fish meals especially during the longest Orthodox Christian fasting season, Great Lent. Yet, detail information on the fish farming practice, level of technologies, production potential of the rivers, number of traders and business engaged in the supply, consumers preferences, awareness and knowledge of the collectors were not reported sufficiently to design sector specific intervention in the areas. Therefore, this assessment aimed to identifying the production potential, challenges and opportunities of fish market from the supply and demand sides for improving the market system. Thus, the assessment included the inquiry on potential, harvesting, handling, marketing and means of transportation supplemented with consumer preference on the feeding habit of the fish meal and nutritional needs. The overall objective of this study was to assess

the production potential and functioning of market system for fishery economic activity. The specific objectives of the study were to:

- ◆ Assess the existing potential of the areas for fishery economic activity;
- ◆ Assess the existing production and marketing practices of fishery;
- ◆ Identify major bottlenecks that prevent the growth of robust and sustainable production and market system for fishery economic activity and opportunities avail for its growth; and.
- ◆ The implementation partners like NGOs, regional or local level energy sector offices, market actors of the sector will be benefited from output of this assessment.

## 2. METHODOLOGY

To meet the aforementioned objectives, the assessment for fishery economic activity was made in southern cluster of PRIME intervention areas. Data were generated using Focus Group Discussion with producers who practice the activity either in cooperatives or as an individual producer. Key informant interviews were also used to obtain the necessary information from experts of various stakeholders or bureaus/offices. The assessment was taken place from July 13 to 29, 2015 and it covered three *weredas* of Guji zone (viz; Liben, Gorodola and Melkaguba), two *weredas* of Liben zone of Ethiopia Somali regional state (viz; Filtu and Dollo) and two *weredas* of Borena zone (Viz; Miyo and Teltele). During the assessment the following key actors were contacted.

- ◆ experts from eight fishery related offices,
- ◆ one NGOs working on this issues,
- ◆ three local individual and cooperative producers, and
- ◆ four hotel owners and managers.

## 3. RESULT AND DISCUSSION

### 3.1. Fishery Potentials of the Southern Cluster

As a land locked country the major source of fishery economic activities in Ethiopia is lakes and rivers. According to Alemu *et al.* (2014), in Ethiopia, most of the fishing so far takes place in the lakes (85%) with only 15% in the rivers. Riverine fishing activities are performed mostly on two of the rivers, the Baro near Gambela in the western part of the country and the Omo in the southern area near the border with Kenya.

The Dawa-Genale river basin also has a fishery activity potential for some part of Southern Oromia and Liben zone of Somali regional state where the basin crosses through. However, the exploitation made so far on these rivers is negligible. According to Alemu *et al.* (2014), fishery potential of Ganale river, which is 480 km long in Ethiopia, is 768 tons/year but the actual landing is only 77 tonson average.

In addition to this, the existing fishery production systems were underway in a very small magnitude in four different rivers namely: Awata and Dawa (Guji Zone) and Gidabo and Galana (Borana zone). It was shown that three fish species viz. Bagrus, Mijligie/Eel (*Anguilla bengalensis labiata*), Barbus species were harvested by the fishermen in the area.

The empirical result of this study also showed that the area has a huge potential, as per the *wereda's* experts who were interviewed during the assessment, for fishery activities. The two big rivers viz, Dawa and Genale together with Sokora and Awata were considered as sources of fishery economic activity. This

was confirmed by producers at Melkaguba, Chenchafe and Gorodola from Guji zones, who produce fish on the two big rivers of the area.

Observation and FGDs with cooperative producer on Genale River which is close to Dawa-Genale hydroelectric dam project, the area called Chenchafe, an insight for the large potential of fishery in the area. Despite the fact that they have a limitation in terms of skill and production material for the production, they know that the river has huge potential.

The other production area which was covered by this assessment was the Gorodola cooperative producers. Their production was underway in Genale River which is rich in *Bargus* species of fish. In addition to the riverine fishery, they also produce fish, commonly African cat fish/*clariasgaricpilus*/, locally called 'Ambaza', and Nile Tilapia (*Oreochromis Niloticus*), locally called 'Qorosso', in their artificial pond. They have production as well as market outlet sites on which they prepare different food items for the local dwellers. They have huge demand in their snack kiosk and have a plan to expand it to other places in the vicinity in collaboration with COOPI.





Figure 1. Pond fishery economic activity as part of integrated agriculture, Gorodola woreda at the bank of Genale River

The other potential production site of the area is Melkaguba, where a producers' cooperative produce fish alongside Dawa River. This area also has very huge potential of fish, though the capital and production skill limitation hindered the production to reach at the expected level of production.



Figure 2 The traditional fisherman having the most common species of fish in Dawa River, around Melkaguba

Furthermore, animal production expert of Dollo wereda of Ethiopian Somali Regional State stated that the aforementioned two rivers also cross the wereda and create an opportunity for fishery production. The wereda has 30 kebeles (PAs) out of which 23 of them are alongside the rivers and majority of the dwellers at the river banks engage in the production of fish for domestic consumption use. In addition to domestically consumed production, some effort was made to commercialize the activity. A cooperative, which was organized by cooperative promotion and agricultural offices of the wereda, was actively engaged in the production of fishery. The cooperative was established in year 2007 and had 18 active members at the time of data collection. There was a lot of demand for the products, but their production was unable to meet the huge demand. This was confirmed by the personal experience of the wereda animal production expert. The expert witnessed that 3 Kg of fish meat was sold at 550 Birr, which revealed that there is huge gap between the demand and supply of the products.

All these production sites have road access to the major market places that makes the fishery economic activity promising to consider as an alternative means of livelihood. The pastoralists by their own or together with other stakeholders in the area can be considered it.

### 3.2. Current Practices of Fishery in the Area

#### 3.2.1. Cooperatives in fishery practices

Organizing pastoral communities in the form of cooperatives enabled the communities to generate income to improve their livelihood. Three cooperatives (Chenchefe, Melkaguba, and Dursitu), were engaged in fishery economic activities. The cooperatives were formed in the southern cluster at different *weredas* to diversify their income other than pastoralism. Chenchefe cooperative of Liben woreda was engaged in fishery business as a cooperative with the support of COOPI. Before support of modern hooks from COOPI, they were harvesting fish with traditional practices. Melkaguba fishery cooperatives engaged in fishery business too. Most importantly, Dursitu integrated women's cooperative, which has 40 active members, involve in fishery economic activity after they obtained support from COOPI in 1999 E.C. Before that, even they didn't have awareness about fishery economic activity as a source of food and income.

In Gorodola *wereda* also one among aforementioned cooperatives was established by 20 members with the support of COOPI in 1994 E.C to engage in this economic activity. However, this cooperative was not actively functioning due to conflict among group members over financial interest. As a result, members of the cooperatives were working in disorganized manner.

These fishery cooperatives were established due to the fish harvesting potentials of Genale and Dawa Rivers. During their establishment as fishery cooperatives, they had less awareness about the economic values of fishery activities and fish as one of consumable food items. In contrast to Chenchefe and Melkaguba cooperatives, Dursitu fishery cooperative was distinctly harvesting fish from both fishpond and Genale River. These created conducive environment for unseasonal supply of fish product to their customer at their kiosk and outlets in the town.

There are different types of fish in Genale River, Dawa River and fish pond found in the area. Among these; catfish, *Shelfdia*, Nile Tilapia, *Oreochromis niloticus* (*Qoroso*), Black African cat fish/*clarias gariepinus*/ (Ambaza), White African cat fish/*clarias gariepinus*/ Ambaza, Lavo, Electric, Mijligie/Eel (*Anguilla bengalensis labiata*), and Kukiwere commonly known types of fishes. Their demand varies seasonally, size, and consumer taste preferences. For instance, African cat fish/*clarias gariepinus*/ avails here. The fish weighs up to 70kg and sold within the price range of 700Br to 1,200Br. However, the demand for fish and its productions were booming during Orthodox Christian period, Lent.

This high price is characteristic of Ethiopian fish market in general and the study area in particular due to the imbalance between demand and supply. Alayu *et al.*, (2015) in their study reinforce that as increasing scarcity (apparently reflecting both rising demand and supply constraints) has resulted in higher real prices for fish, there is a tendency for fish to become a luxury product consumed by higher income groups. Traders and other observers suggest that higher income groups may represent a significant source of the soaring demand (reflecting wider exposure to different types of food and echoing the global shift in demand towards fish as a healthier source of animal protein). Nevertheless, population increase (particularly in growing Addis Ababa) and a modest general increase in incomes are also factors.

Therefore, the sector has a lucrative market if appropriate intervention is made by stakeholders in the sector. This encourages cooperatives to exert their effort to improve their production system. The government also has a clear directive with an objective to increase the supply of safe and good quality fish and to ensure a sustainable contribution of the fisheries towards food security (Federal Negarit Gazeta, 2003).



Figure 3. 'Kuki' fish, as locally named, type harvesting at Dawa River (Melkaguba Fishery Cooperatives)

The cooperatives need more support to improve their production system and be more effective and profitable in this economic activity. According to Dursitu Cooperatives' current progress, fish production system is profitable and encouraging. These cooperatives were primarily harvesting fish to supply for different hotels in their nearby town.



Figure 4. Sample fish handling equipment and hook for Dursitu cooperatives (Handling fish support for Dursitu and Hook for Chencheffe cooperatives)

It was difficult to estimate fish production capacities in terms of months or days as a result of seasonal variation. But the focus group discussion with producers and expert interview in the area clearly revealed that the area has immense potential for fishery economic activity.



Figure 5. Dursitu Integrated fishery and Poultry Cooperatives fish pond harvesting

The other potential area which was covered during the assessment is Chenchefe, which is found around Dawa-Genale hydro-electric dam project area. Despite the fact that the area has potential for the production. Chenchefe Cooperative was facing illegal fish harvesters from Genale River Dam construction Chinese workers. As recognized by fishery cooperative and the *woreda* experts, no protection was put in place for such illegal fish harvesters.

Despite the potentials of these two Rivers for the economic activity, this fishery cooperative is facing many challenges. For instance; lack of transportation facilities, lack of skill, refrigerators, hooks, boat, weak market linkage and modern fishing gears like seine-nets, gill net and scoop net were among the challenges mentioned by producers who participate in the focus group discussion.



Figure 6. Focus Group Discussion with Cooperatives (Melkaguba, Dursitu & Chenchefe from left to right)



### 3.2.2. Market system of the product

The demand for fishery product is very high and ever increasing. As per Sileshi's (2010) estimation, even if the available stocks of these fishery water will be fully exploited in the near future, both current and future demand for fish by the population cannot be met. For instance, current total demand for fish is about 67 thousand tones, which is envisaged to grow nearly to 95 thousand tones in 2015, and 118 thousand tones in 2025. To fill this gap, therefore, new alternative fish supply sources must be found.

However, the supply is very limited in Ethiopia in general and the study area in particular. As it was observed from the above analysis, there was very limited supply for the product. Sometimes those who demand the product were forced to look distant market.

In the study area too, the demand side of the sector is very promising that makes the sector can be considered as an alternative way of livelihood for the TOPs. The data obtained from hotels in Negele revealed that meals of fish and fish product were one of the top rated items demanded by their customers. One of the hotel owner said that tourist and the local people during Orthodox Christian fasting time frequently ask the food item. Cashier from the other hotel in the same town also said that "If we have a fish here in our menu, our customers are willing to order only that". These clearly revealed that there is very high demand for the product, which in turn makes the sector very promising.

The finding of this study is consistent with others in the same area. Assefa (2014) studied that although per capital consumption of fish is very low in Ethiopia, there is steady growth in demand reflecting population increase, rising incomes and a shift in preferences. "Qorosso" was the most common and popular fish, found in most lakes and important river systems, and is caught in large quantities. It was a significant contribution to the income and food supply in the rural community. Traditionally, it is consumed most during the long fasting season before Easter, when all other animal products are forbidden to eat by the followers of the Orthodox Religion.

However, the sector at the study area had marketing challenges in the study area. The major marketing constraints faced by the traditional fishermen were: (a) transportation problem to reach the market sites, (b) prices that were insufficiently remunerative to fishermen during the time when the buyer and sellers meet and the traditional fisher men forced to sell at whatever price offered by the buyer and (c) loss of quality because of limited options for conservation and time/distance from trading points.

### 3.3. Opportunities and Challenges of Fishery Practices in the Area

Fishery economic activity in the area has a lot of challenges for its development in terms of production and distribution. Most of the challenges were related to the supply sides of the market which was emanated from limited skill and financial constraints of the potential actors who can involve in this economic activity. However, the sector is very promising to consider it as an alternative livelihood activity since a lot of opportunities are available to realize it. In these sections, effort was made to figure out the opportunities and challenges available in the area that support and hinder the better performance of the sector, respectively.

#### 3.3.1. Opportunities

- ◆ **The better accessibility of surface water:** Area has huge production potential since two large viz, Genale and Dawa as well as other small rivers like Awata and Sokora crossing through it.

- ◆ **High and increasing demand:** From the 30 hotels rapid assessment of COOPI and the interview with owners and employees of hotels in Negelle Borena town, it has been understood that the demand for the product was very high. In addition to this, the fish eating campaign which is underway in the area by various stakeholders will definitely improve the demand for the product. Another most important issue that was revealed as an opportunity for the ever increasing trend of demand for fish was that the society doesn't have a religious as well as cultural prohibition from consumption of the item.
- ◆ **The ever increasing price of meat:** The meat market characteristic at the study sites was not different from other parts of the country. The price of meat in the country has been increasing and that leads the society to look for other close substitutes. Fish is one of the best candidates for this alternative.
- ◆ **Society is easy to mobilize and availability of cooperative practices:** Experts at *wereda* level and other GOs and NGOs workers contacted during the assessment asserted that the dwellers in the area have a very good social capital to work together and they are easy to organize. This was understood while previous cooperatives formation underwent.
- ◆ Government has interest on the sector to use it as one of the means for food security strategy as well as employment creation.
- ◆ **Enough human resource:** like other areas of the country, the study area is characterized by large number of young population and the youth are ready to join the production and market system of fishery economic activities. This was revealed during the fish eating campaign organized at in the area.
- ◆ The local level officials are willing to cooperate with other stakeholders who are interested to be involved for the betterment of the sector and livelihood improvement of the society in effect.

### 3.3.2. Challenges

- ◆ **Lack of production skill and technical knowhow:** it has been realized that the producers have a long lasting tradition about the difficulty of finding fish in the river during the rainy season, which is contradictory with the scientific explanation came from the Ziway research center. This was mainly due to a very limited knowledge in the society about the modern fishing economic activities.
- ◆ **Weak market linkage and limited market information:** these hinder the producer to reach their customers. Sometimes it was observed that the fishers return back to their home without selling the product though there are hotels and individuals who badly want to have it.
- ◆ **Logistic and working capital constraint for producers:** Producers do not have enough equipment for fish harvesting as well as preserve it as fresh as possible to reach their final consumer without contamination. In addition, they don't have means of transportation to reach the market place with a short possible period that preserve the product from contamination. In addition, producers have a very critical problems related to production equipment like hook or net.
- ◆ **The government commitment is very weak:** this can be revealed from the very limited budget and human resource which were allotted for this sub sector. In addition the local administration is passive in the participation of fish eating campaign in the area that envisioned to improve awareness of different actors of fish market.

- ◆ **Lack of grid electrification:** this made it more difficult to preserve the product which is perishable.
- ◆ **The cooperatives are not well structured and well-functioning:** due to lack of awareness and capital limitation, cooperatives in the area are not well functioning to rely on the production and distribution of this product. If they could make it, the cooperatives bring about the better absorbing power of the human resources from the TOPs. The primary reason for this was that the members didn't trust the business as a means of life.
- ◆ **Coordination failure among actors, both from GO and NGOs, involved in the development of production and distribution of fishery practices.**

#### 4. CONCLUSION AND RECOMMENDATION

##### 4.1. Conclusion

Based on the finding illustrated in the previous section, the following conclusive remarks has been forwarded. In this sector, different stakeholders were involved but the development of fishery economic activity in the area is at its infant stage. From rapid assessment of three woredas of Guji zone (viz: Liben, Gorodola and Melkaguba), two woredas of Liben Zone of Somali Regional State (viz: Filtu and Dollo) and two weredas of Borena zone (Viz: Miyo and Teltele), it was understood that the sector is under developed. There are various reasons for this underdevelopment: lack of production skill and technical knowhow, weak market linkage and limited market information, logistic and producers' constraint of working capital, very weak government commitment, lack of grid electrification, lack of structured and well-functioning activities in cooperatives, and coordination failure among actors in the subsector were some of the reasons among others which contributed to the low level of development of the sector in the study areas.

However, if effort is exerted to rectify the above problems, the area has a huge potential for fishery economic activities due to its immense water resources. The two big rivers viz, Dawa and Genale together with Sokora and Awata cross the area that creates a fertile ground to develop fishery economic activity as an alternative livelihood for the dwellers of the area including the pastoralists. In addition to this huge potential, the assessment revealed that there are also various opportunities that make the sector promising. These are willingness of youths to join the sector, the society is easy to mobilize, the ever increasing price of meat, the society doesn't have cultural or religious prohibition from consumption of fish and the government has interest for the sector.

##### 4.2. Recommendations

Based on the findings of the study, the following policy implications and/or PRIME's leverage points were forwarded.

- ◆ **Improve the market system:** since the most important challenge of the sector is the very loose linkage between buyers and sellers, PRIME and other agent of the sector can work on the development of the market system via provision of grant for the sellers who can form their outlet in the town and able to purchase the produce from the producer at the farm gate. In addition, it can be done through supporting the producers to have market outlet in the area, like towns, where the demand is very high.

- ◆ **Awareness creation campaign for the consumer and producers:** It was observed that the areas perceived that the best time to have fish as a food item is during the Orthodox Christian fasting time. This can be changed via different types of campaign to aware the consumer to demand it in other season and producers to produce the product in other seasons. Stakeholders should actively engaged in fish eating campaign to raise awareness.
- ◆ **Support producers:** Both individual and cooperative producers have skill and capital constraints. PRIME and other stakeholders should involve in capacity building training for producers. In addition, direct provision of fishery activity's equipment like refrigerator, icebox, hook, boat and net together with the training for their usage is necessary for the betterment of the production sector.
- ◆ **Wereda level workers awareness** should be improved via training about the fishery economic activity to provide better extension service for the producers. PRIME and other stakeholders of the sector can leverage by providing or facilitating training and exposure visit to areas where fishery economic activities are well developed like Hawassa and Ziway.
- ◆ **Strengthen the existing cooperatives and establish new ones** around the banks of the major rivers which have a great potential of fish to operate as producer of fish or an intermediaries which bridge producers with the final consumers, hotels, wholesalers and retailers in the town. PRIME can support and collaborate with cooperative promotion offices.
- ◆ **Consultative workshop** to create conducive environment for actors to work together for the development of the sector. PRIME together with other stakeholders can facilitate this.

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## 7. ACKNOWLEDGMENT

We are highly thankful for PRIME project and Haramaya University for their financial and material support. The field officer of HU-PRIME, Adamu Tefera deserves special thanks for his unreserved effort in facilitating field works the data collection. We are also indebted to Mr. Netsaalem (IR3 technical advisor of PRIME project) for his constructive comments to improve the quality of the paper. Last but not least, we are very much thankful for the support we have received from Mr. Genemo (MC, Negelle) during the data collection period.

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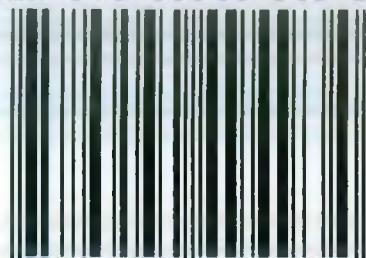
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ISBN 978-99944-949-3-4



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