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EPTD Workshop Summary Paper 17

POLICIES FOR IMPROVED LAND MANAGEMENT AND AGRICULTURAL MARKET DEVELOPMENT IN THE ETHIOPIAN HIGHLANDS

Summary of Papers and Proceedings of a Workshop
Held at the Ghion Hotel
Addis Ababa, Ethiopia
February 19 and 20, 2004

Edited by
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WELCOME REMARKS

John Pender

International Food Policy Research Institute

Mr. Chairman, His Excellency Professor Mesfin Abebe, Advisor to the Deputy Prime Minister,

His Excellency Ato Gebremedhin Belay, Vice Minister of Agriculture,

Distinguished guests and colleagues:

On behalf of the International Food Policy Research Institute (IFPRI), it is a great pleasure to welcome you to this workshop on "Policies for Improved Land Management and Agricultural Market Development in the Ethiopian Highlands." The objectives of this workshop are to review and discuss the main findings and policy implications of recent research conducted on these topics by IFPRI, Wageningen University and Research Center (WUR), the International Livestock Research Institute (ILRI), Mekelle University (MU), the Ethiopian Agricultural Research Organization (EARO) and other Ethiopian collaborators; to discuss options for improving the development of agricultural markets and land management in Ethiopia, considering different stakeholders' perspectives; and to develop recommendations for priority policy actions and further research based upon lessons learned from the research and remaining knowledge gaps.

IFPRI has worked for more than a decade in Ethiopia studying the root causes of the interrelated problems of famine, rural poverty, low agricultural productivity and natural resource degradation, and helping to identify strategies and policies to overcome these problems. The need for effective and efficient markets for agricultural commodities and productive inputs, as well as effective measures to combat land degradation are

clearly recognized by the government of Ethiopia in its current rural development strategy and poverty reduction strategy. Ethiopia has made great strides in recent years in increasing farmers' access to productive technologies. Yet as we are all increasingly aware, these advances are necessary but not sufficient to achieve the goal of agriculturally led industrialization. Market development and sustainable natural resource management are essential building blocks of a successful rural development strategy, requiring policy makers and other stakeholders to identify and invest in an appropriate mix of institutions, infrastructure, information, and innovation systems.

This workshop is intended to help contribute to these important efforts by taking stock of what is known and what we have learned from several years of recent research on sustainable land management and agricultural market development. I ask for open and candid discussions of the issues and potential solutions that will be raised, and wish us all fruitful deliberations.

On behalf of IFPRI, I would like to thank the government of The Netherlands for providing financial support to this research; our partners at WUR, ILRI, MU for their collaboration; the many stakeholders in Ethiopia who contributed their time to help in the planning of the research and discussions of the results, including the participants of this workshop; and especially the many farmers, community leaders, traders, and officials who participated in the conduct of the research. It is my sincere hope that the research results will be useful in helping to find solutions to their problems.

WELCOME REMARKS

Ruerd Ruben

Wageningen University and Research Center, the Netherlands

Mr. Chairman, His Excellency Professor Mesfin Abebe, Advisor to the Deputy Prime Minister,

His Excellency Ato Gebremedhin Belay, Vice Minister of Agriculture,

Distinguished guests and colleagues,

On behalf of Wageningen University and Research Center, we wish you a warm welcome to this workshop, where we can discuss the preliminary results of 3 years of joint research between WUR, MU and IFPRI on policies and strategies for sustainable natural resource management in the northern highlands of Ethiopia.

We appreciate very much the invitation for joining this workshop, providing a new opportunity for searching promising pathways for poverty alleviation and sustainable development in less-favored areas.

I would like to use this opportunity also to express our gratitude to our colleagues at MU and ILRI for all their assistance provided during the field research and data analysis. Similarly we are grateful to EARO and BOA, at the administrative t*abia* and *wereda* levels, for their continuous support to this research project.

We look forward to intensive and hopefully fruitful discussions during the next two workshop days and we would like to encourage you to actively participate in the discussions and debates.

WELCOME REMARKS

Bruce Scott

International Livestock Research Institute

Mr. Chairman, His Excellency Professor Mesfin Abebe, with a rank of Minister, Advisor to the Deputy Prime Minister,

His Excellency Ato Gebremedhin Belay, Vice Minister of Agriculture,

Distinguished guests, Ladies and Gentlemen,

I am delighted to be at this workshop and on behalf of ILRI would like to welcome you all to this important meeting.

The work that will be presented at this workshop is very much in line with ILRI's new strategy. ILRI's new strategy focuses on the role of livestock as a pathway out of poverty. It primarily focuses on:

- Securing assets
- Improving assets
- Improving access to markets

We at ILRI believe in partnerships for we cannot do it alone. The research work that will be presented at this workshop is an example of such partnerships with national institutions (e.g. Mekele University, the Tigray, Amhara and Oromia Bureaus of Agriculture, EARO), universities and international research institutions such as IFPRI and WUR. This project has been ahead of the current thinking at ILRI in the way it

features partnerships, fits squarely in ILRI's new strategy, and focuses on IRNM. Phase I of this project has been awarded the 2001 Neville Clark Award for Outstanding Teamwork.

ILRI is doing business differently. It is transforming its Addis Ababa campus into a hub, will be focusing on Integrated Natural Resource Management (INRM) and working towards technology transfer, has based two out of its five research themes in Addis Ababa, is building on its partnerships, and will be hosting ISNAR.

The Government of Ethiopia highlights the importance of agriculture as shown by its commitment to the recent coalition on food security. To play its role ILRI is looking for strong evidence based results to better inform decisions. It is not just an academic exercise, but you as researchers must ensure that the results are sound and that they shape policy.

In closing, this is work that builds on past work and I would like to recognize Simeon Ehui's contribution. I would like to thank all partners for their contribution, thanks to John Pender, Mohammad Jabbar, Berhanu Gebremedhin, Muluhiwot Getachew and others for their hard work. Thank you Vice Minister Gebremedhin Belay for being here. I wish you all good deliberations.

OPENING OF WORKSHOP

Ato Gebremedhin Belay, Vice Minister of Agriculture

Dear sponsors of the workshop,

Distinguished representatives of regional governments,

Honorable guests, ladies and gentleman.

It is a great honor to welcome those of you who are visitors from other countries to Ethiopia, and to welcome all of you to this workshop on "Policies for Improved Land Management and Agricultural Market Development in the Ethiopian Highlands."

I understand that this workshop will review results of research conducted for the past three years by the International Food Policy Research Institute, Wageningen University and Research Center, the International Livestock Research Institute, and Mekelle University, in collaboration with many Ethiopian researchers and institutions. This research has sought to identify technologies, institutions and policies to improve land management and market development in the Ethiopian highlands, focusing on the regions of Tigray, Amhara and Oromiya.

This research comes at a critical time in Ethiopia's development, and addresses some of our most pressing needs. Poverty reduction is the core objective of the Ethiopian government, and to achieve that, the overriding focus of our development strategy is to promote market-led development of agriculture, which is the primary source of livelihood of 85 percent of our people and the vast majority of the poor. Development of agriculture will fuel the growth of industry and other sectors of the economy by generating surpluses

that can be invested in these sectors, foreign exchange, and domestic demand for industrial products.

We have made significant progress since the early 1990's promoting agricultural development and poverty reduction. Our country has achieved macroeconomic stability, liberalized agricultural markets, devolved authority to the regional states and local governments, and instituted massive investments in roads, education, health care, water supply, agricultural extension and credit oriented towards smallholder farmers. These policies and investments led to solid economic growth rates, averaging nearly 6 percent per year between 1992 and 2002, and to declining rural poverty, which declined from 47 percent in 1995/96 to 41 percent in 1999/2000.

Although the economic situation has improved in the past decade, much remains to be done to achieve sustainable agricultural development in Ethiopia, as the recent famine painfully demonstrated. Two of the most critical challenges are land degradation and poor market development. Land degradation resulting from depletion of forests; overgrazing of livestock; plowing on steep and fragile terrain; and limited use of fallow, soil and water conservation measures, fertilizer or recycling of organic materials to the soil have contributed to severe problems of soil erosion, depletion of soil nutrients and organic matter, and increased exposure to risks of famine. Policies and programs promoting conservation and rehabilitation of natural resources have done much to help stem these problems in many degraded areas, but too much of Ethiopia's once fertile highlands remain severely degraded. Unless effective methods of conserving and restoring the productivity of our scarce natural resources are more broadly adopted by our

farmers, their ability to sustainably improve agricultural productivity, rural incomes and food security will be undermined.

Development of agricultural markets and market institutions is also critically needed. As the crash of maize prices following the bumper harvests of 2001 and 2002 showed, success in boosting farmers' productivity through improved technologies is necessary but not sufficient for farmers to escape poverty and food insecurity. Farmers need reliable and competitive markets in which to sell their products if such price collapses and loss of confidence in improved technologies are to be avoided. Reliable and competitive food markets are also needed to address shortages in chronically food-deficit and famine prone regions, so that households in these regions can come to rely on markets rather than food aid to assure their food security.

The government of Ethiopia is pursuing many new policies and approaches to address these challenges. Among these are

- expanding agricultural technical and vocational training centers throughout the country;
- greatly increasing the number and improving the training of extension agents so that there will be three trained extension agents serving each kebele:
- developing technical assistance packages oriented towards improving farmers' incomes considering what is profitable in different agro-ecological contexts;
- investing in small-scale irrigation and water harvesting, especially in drought-prone areas;
- encouraging private sector participation in development of rural technology;

- encouraging establishment of rural banks, cooperatives, warehouses, insurance firms and micro-finance institutions;
- developing grades and standards for grains and other commodities;
- investing in an improved commodity price information system;
- developing a warehouse receipts system for storable commodities to facilitate storage and credit; and
- investigating the establishment of a commodity exchange.

In pursuing these new approaches, the federal, regional and local governments need information about the potential costs and impacts of alternative courses of action, and advice about how best to proceed. I believe that the research being discussed in this workshop can be of great help in this regard, and am very interested to know the lessons learned. I also look forward to the important discussions on these issues that will take place during this workshop.

Honorable guests, ladies and gentlemen:

I would like to express my appreciation to the sponsors of this workshop and to all who contributed to its realization. I wish us all success in these deliberations, and now declare this workshop open.

PROJECT BACKGROUND, OBJECTIVES, AND ACTIVITIES; WORKSHOP OBJECTIVES

John Pender, IFPRI

BACKGROUND/RATIONALE OF PROJECT

- Land degradation and limited market development constrain agricultural productivity, food security and poverty reduction in the Ethiopian highlands
- Success of earlier policies promoting improved agricultural production in many areas, but
    - Impacts not as positive everywhere, especially in drought-prone areas
    - Success undermined by collapsing prices after bumper harvests
    - Continuing vulnerability to famine

Information needed on policies to promote market development and improved land management

The present project seeks to help address these issues:

- Builds on previous research on sustainable land management led by IFPRI, ILRI, Mekelle University, regional agriculture bureaus and other partners
- Began in January 2001
- Financed by the Netherlands government, IFPRI and Wageningen University and Research Center (WUR)
- Collaborators: IFPRI, WUR, ILRI, Mekelle University, EARO, others

GOAL, PURPOSE AND OBJECTIVES

Long-Term Goal:

- To contribute to improved land management and market development in the Ethiopian highlands, in order to increase agricultural productivity, reduce poverty and ensure sustainable use of natural resources.

Immediate Purpose:

- To help policy makers in Ethiopia identify and assess strategies, including technology development policies, to achieve that goal.

SPECIFIC OBJECTIVES

- To identify the key factors influencing market development and land management in the Ethiopian highlands and their implications for agricultural productivity, sustainability and poverty;

- To identify and assess policy, institutional and technological strategies to promote more productive, sustainable, and poverty reducing market development and land management;

- To strengthen the capacity of collaborators in the Ethiopian highlands to develop and implement such strategies, based upon policy research;

- To increase awareness of the underlying causes of market development and land degradation problems in the Ethiopian highlands and promising strategies for solving the problems.

OUTPUTS AND ACTIVITIES

- The main factors affecting market development and land management will be identified and their implications assessed, based upon analysis of:

    - Community and household surveys (prior IFPRI/ILRI project)

  - Market surveys
  - Agro-ecological analyses

- The impacts of alternative policy, institutional and technological scenarios on markets and land management and their implications will be assessed, based on:
  - Community and household level bio-economic models
  - Market-level economic models

- Promising policy, institutional, and technological strategies to promote more sustainable and poverty-reducing market development and land management will be identified, based on:
  - Previous activities
  - Consultations with key policy makers, collaborators, and other stakeholders
  - Policy workshops

- The capacity of collaborators and clients in Ethiopia to conduct policy research related to land management will be strengthened, based on:
  - Involvement of local collaborators in study design, implementation, analysis and dissemination of results
  - Training workshops
  - Graduate training at WUR for some collaborators

- Information generated by the project will be disseminated in Ethiopia and in international outlets, through
  - Policy workshops

- Regional Policy Conference
- Dissemination of publications – research reports, synthesis reports, policy briefs, etc.

OBJECTIVES OF WORKSHOP

- To review and discuss findings and policy implications of research on agricultural markets and sustainable land management in Ethiopia under the project.
- To discuss options for improving the development of agricultural markets and land management in Ethiopia, considering perspectives of different stakeholders.
- To develop recommendations for priority policy actions and further research based upon consideration of lessons learned and remaining knowledge gaps.

SESSION II: AGRO-ECOLOGICAL AND BIO-ECONOMIC ANALYSES OF LAND MANAGEMENT IN TIGRAY

Policies and Technologies for Sustainable Land Management in the Ethiopian Highlands

Ruerd Ruben, Gideon Kruseman and Girmay Tesfay

Agroecological Analyses in Tigray

Herman van Keulen and Huib Hengsdijk

Soil Nutrient Flows and Integrated Nutrient Management in the Northern Ethiopian Highlands

Assefa Abegaz

Impacts of Policy and Livelihood Strategies for Poverty Reduction and Sustainable Land Use in Tigray: Results of the Bio-Economic Model

Gideon Kruseman

POLICIES AND TECHNOLOGIES FOR SUSTAINABLE LAND MANAGEMENT IN THE ETHIOPIAN HIGHLANDS

Ruerd Ruben,[1] Gideon Kruseman,[1] and Girmay Tesfay[2]

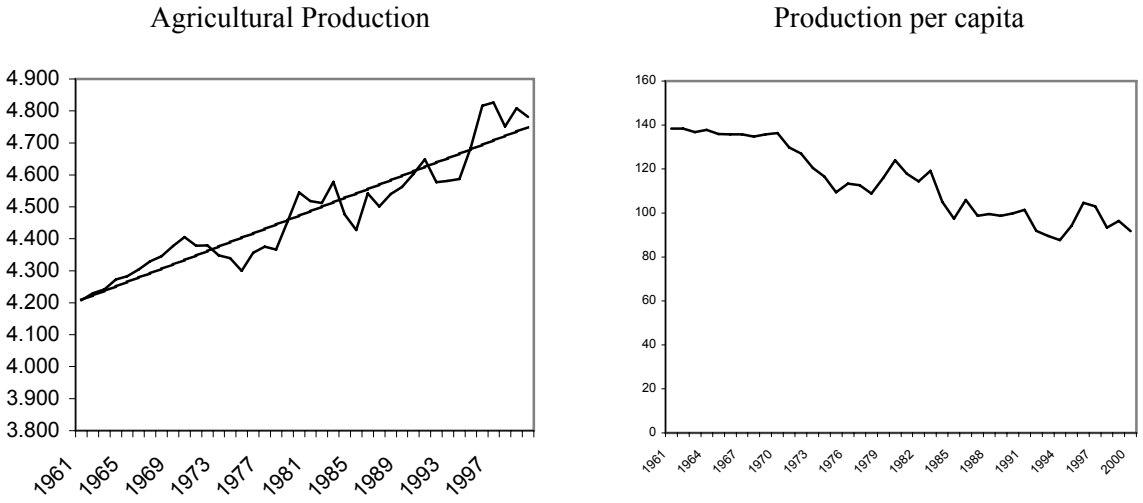
[1] Wageningen University and Research Center, the Netherlands
[2] Mekelle University, Tigray, Ethiopia

INTRODUCTION

In this presentation we will briefly outline the research approach used in the project 'Policies for Sustainable Land Management in the Ethiopian Highlands' and provide a concise summary of the main results and findings. We focus attention on the available production systems and livelihood strategies for reducing poverty and enhancing sustainable natural resource management, and the appropriate policy instruments for enhancing their adoption by rural households.

The presentation starts with a brief discussion on agricultural development trends and the macroeconomic policy framework of the Ethiopian government and its implications for rural land use and other resource allocation decisions. This is followed by a summary of the results of the different research components at village/watershed, farm household and plot/field level. Finally, we review promising technology options and policy devices that enable farmers to improve welfare and sustain their natural resource base.

Figure 1--Agricultural production and production per capita in Ethiopia (1960-2001)



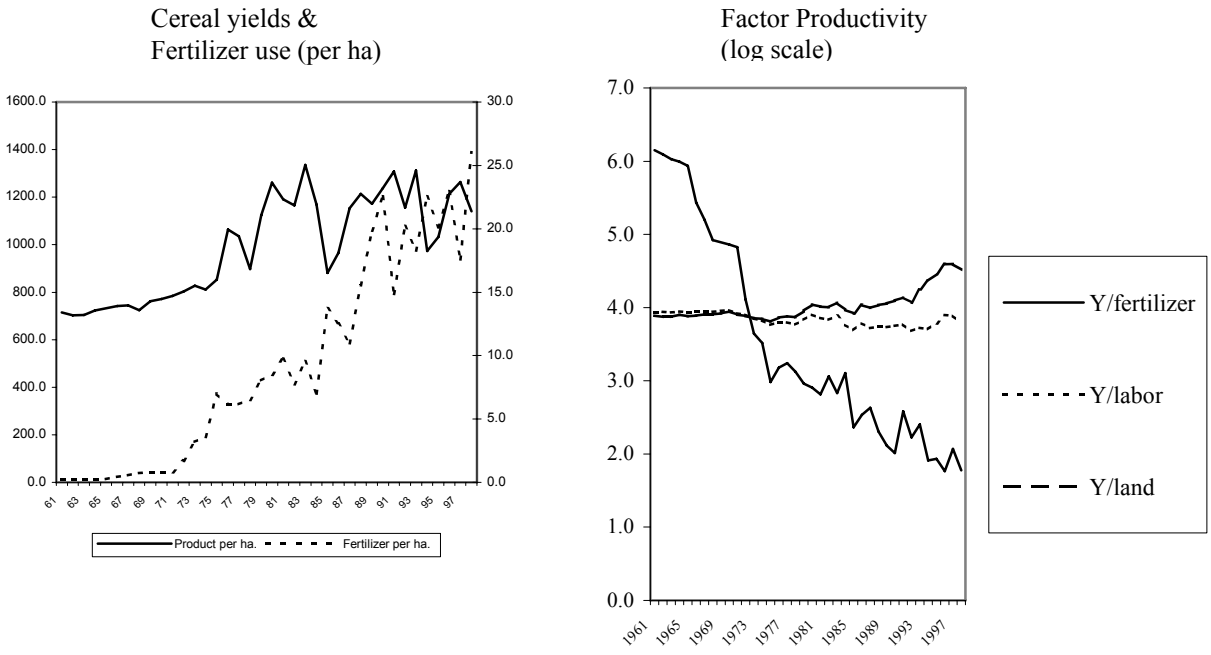
AGRICULTURAL DEVELOPMENT

The long-term trends in agricultural production and productivity for Ethiopia over the last four decades indicate that the growth rate in crop yields (1.4 percent per year during 1960-2001 period) lags behind population growth (2.5 percent per year). Consequently, internal per capita food availability is steadily decreasing (see Figure 1). In addition, variability in yields is becoming more pronounced, making farmers' decisions regarding crop choice and input use more complicated.

The trends in agricultural yields and input use also indicate a slow growth rate of cereal yields, particularly after 1983, in spite of substantial increases in the use of chemical fertilizers (see Figure 2). This points towards a tendency of diminishing efficiency of fertilizer applications in terms of crop output per unit of fertilizer use. The reduced uptake efficiency underlying this tendency critically affects yield growth. The latter effect may be

caused by different factors, like the absorption of nutrients in the soil, the inadequate composition and timing of nutrient applications, or the scarcity of complementary inputs.

Figure 2--Agricultural productivity and input efficiency in Ethiopia (1960-2001)



Sonneveld (2002) reviewed the macroeconomic implications of soil degradation and nutrient depletion in Ethiopia in a recent study[1] Making use of a simulation approach, yield losses are estimated under the 'business as usual scenario' (-22 percent) compared to a scenario where only soil and water conservation measures are taken (- 20 percent) and a strategy based on better fertilizer use (- 6 percent). Food availability per capita in the year 2001 could be more than doubled through the application of new resource management strategies, indicating that there is still substantial room for technology improvements.

1 B.G.J.S. Sonneveld (2002) Land under Pressure: The Impact of Water Erosion on Food Production in Ethiopia. Amsterdam: Free University.

RESOURCE DEGRADATION

The northern Ethiopian highlands face multiple environmental problems related to water erosion, soil and pasture degradation and deforestation. These processes largely coincide and point to the occurrence of several limiting factors (nutrients, water, energy, manure, etc.). A closer analysis of the relationships between different resource degradation processes also indicates that many of these are closely interlinked and mutually reinforcing each other. Typical examples are the relations between high population density and poor soil management that lead to extensive land use patterns, the low yields and household incomes that limit in-depth investments, and the increasing energy demands which lead to deforestation and reduce the availability of manure.

RESEARCH APPROACH

Within this setting, the WUR-IFPRI-MU research program aims to identify improved land management options to increase agricultural productivity, reduce poverty and ensure sustainable use of natural resources. The immediate purpose is to assist policy makers in identifying and assessing better NRM strategies, including technology development policies. Specific objectives are (a) to identify key factors influencing land management and their impact on productivity (yield) and poverty (income), and (b) to identify and assess policy, institutional and technological strategies to promote productive and poverty reducing land management.

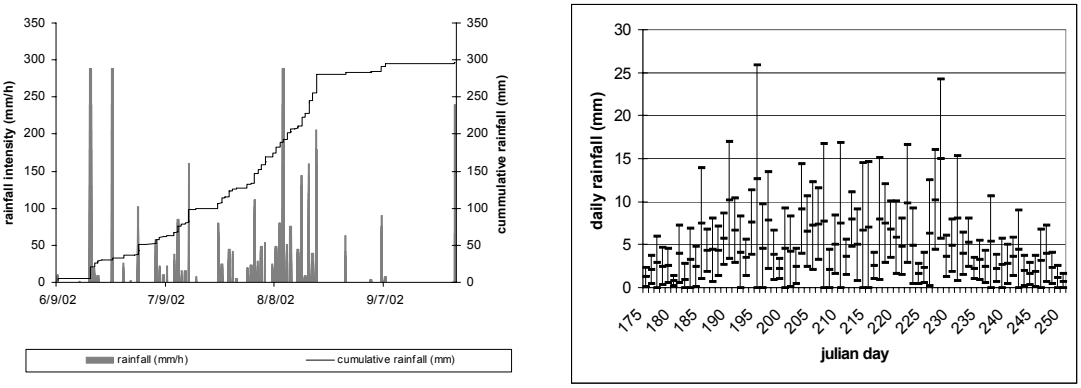
Field research was conducted in two villages in the highlands of Tigray, which present typical situations of limited natural resources and *remoteness (Gobo Deguat* village in *Hawzen Woreda*) and more favorable natural resource conditions combined with better accessibility (*Teghane* village in *Atsbi Womberta Woreda*). Current land use activities in these villages

include cropping (wheat, barley, pulses, millet and teff), livestock production (cattle, oxen, sheep and goats) and forestry woodlots.

LAND USE OPTIONS

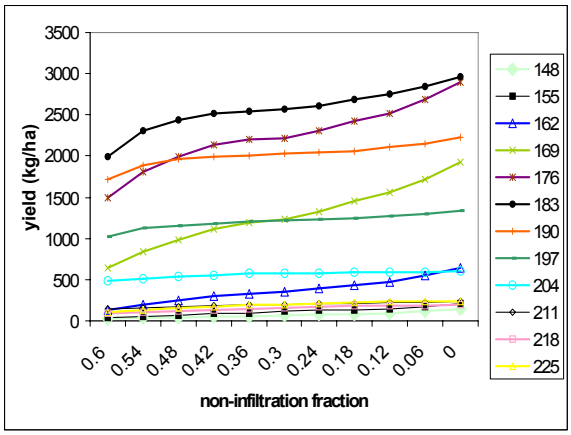
The biophysical assessment of land use options was based on a detailed analysis of weather and climate conditions, sowing dates and nutrient balances. Irregular rainfall and concentrated showers (with 3-5 events accounting for more than 50 percent of annual rainfall) make the selection of sowing dates of critical importance (see Figure 3). In the Tigray region, rainfall levels are in principle sufficient for arable cropping, but rainfall distribution leads to moisture stress.

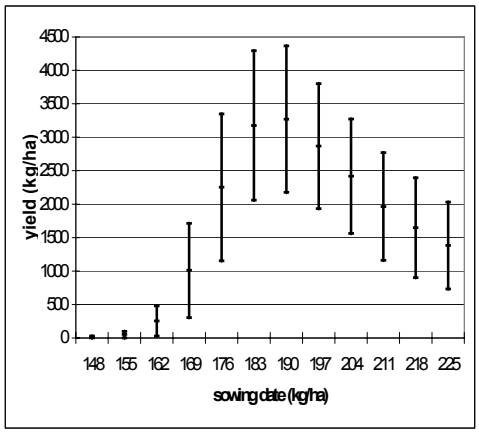
Figure 3--Tigray: rainfall distribution pattern



According to the crop simulation model results, the selection of sowing dates is one of the most important factors affecting the yield. Differences in yields between 'good' and 'bad' seasons are between 50 percent (wheat and barley) and 66 percent (millet and sorghum). Different infiltration rates are largely responsible for yield differences according to the sowing date (see Figure 4).

Figure 4--Sowing dates and yields





The effectiveness of soil and water conservation measures is also very much dependent on the sowing date. Positive yield effects with bunds are registered at sub-optimal sowing dates, but negative results are also possible when farmers apply optimal timing. In the latter case, the sacrifice of land area outweighs the positive effects of moisture retention.

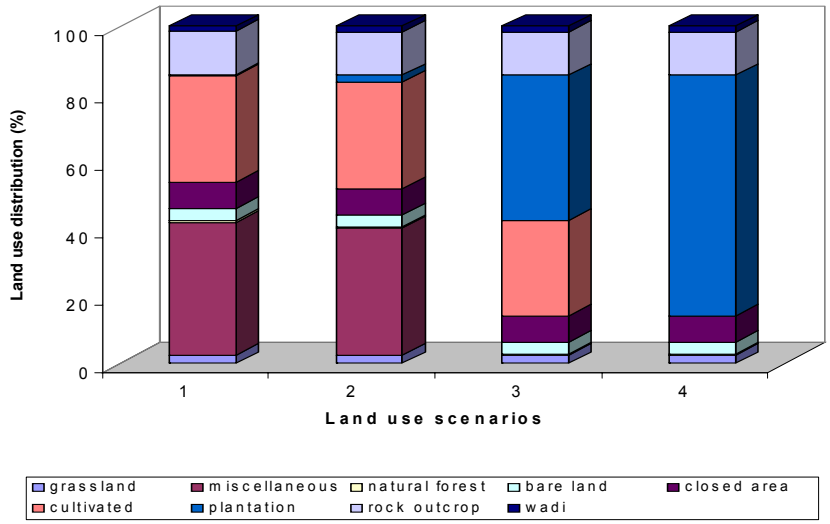
Nutrient balances have been calculated for typical farms in the research sites, making use of the NUTMON approach. On average, a N-loss of 27 kg/ha is registered, mainly due to crop and residue harvesting and soil erosion. The amount of inorganic fertilizers applied is usually insufficient, while the lower uptake from organic sources of fertilizers is insufficient to compensate for the nutrient losses.

VILLAGE ANALYSIS

The spatial analysis at village and watershed level relied on overlays of digital information on soil types, land use pattern and altitudes. The LISEM model has been used to identify spatial flows of sediments and water. This model includes hydrological and soil erosion processes and uses information on rainfall, infiltration, surface storage, runoff and vertical flows

to simulate the effect of land use on water and nutrient availability. The latter results are applied for a scenario analysis to identify possible land cover changes that could reduce erosion (see Figure 5). The village scenarios with different degrees of forest cover (ranging from 2.2 to 71 percent) indicate that – even with massive reforestation – soil erosion can only be slightly controlled (from 31 to 26 T/ha). This implies that only with major changes in land management can the village-level resource base be sufficiently protected.

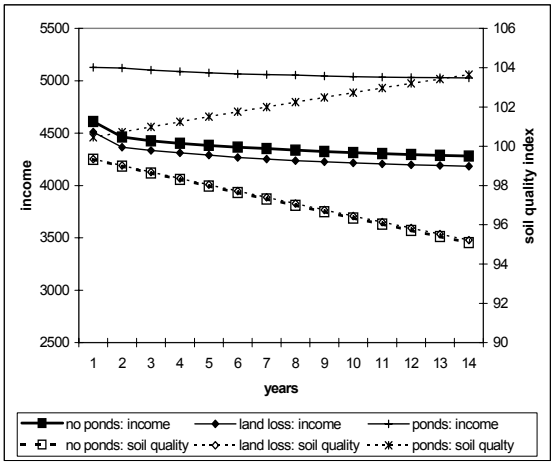
Figure 5--Gobo Deguat- Alternative land use scenarios

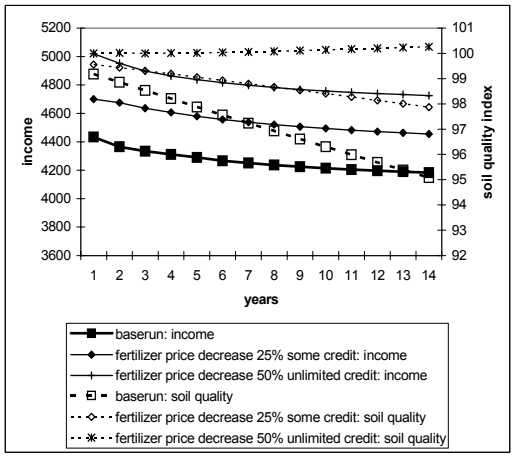


FARM HOUSEHOLD MODELS

The appraisal of the technical and economic options for farmers to adjust land management is based on an integrated bio-economic farm household modeling approach. The model combined a range of actual and potential agroecological input-output coefficients with household resources and consumption preferences. Different strategies are simulated to identify technical options that guarantee sustained or improved farmers' welfare and better nutrient balances. The time perspective is considered through a 15-years time horizon with relevant feedback mechanisms (see Figure 6).

Figure 6--Simulation results for (a) ponds and (b) fertilizer/credit policy mix





The bio-economic model is focusing attention on the complementarities between physical soil and water conservation and chemical soil management strategies. For example, it is shown that terraces can substantially improve nutrient uptake efficiency. Otherwise, water harvesting with farm-level ponds can be effective to guarantee water availability through supplementary irrigation in critical periods, thus improving both farmers' income and nutrient balances. Compared to micro-dams, ponds require less land and are better able to reduce moisture stress. Improved livestock management combined with fodder production and manure recycling provides options for reducing pasture degradation.

POLICY INSTRUMENTS

The bio-economic model framework could be used to assess the impact of different policy instruments on farmers' resource use decisions and the implications for income and nutrient balances. We looked at price instruments, credit provision, food/cash for work, off-farm employment and tenure security as major policy instruments. Better provision of chemical fertilizers at lower costs proved to be of critical importance for reaching higher yields (see Figure 6b). Access to rural financial services (credit) enables farmers to purchase chemical fertilizers.

Other indirect policy instruments (like food for work and off-farm labor) provide mainly positive expenditure effects.

Institutional measures are important to guarantee effective community involvement. We found that community and private SWC measures are not conflicting, but that credit provision could be better linked to SWC programs. Limited credit use is not only due to supply limitations, but also related to demand-side constraints (e.g. risk-averse farmers that do not apply for credit). Besides land tenure security, also ownership and responsibilities for maintenance of trees and SWC structures deserves attention.

CONCLUSIONS

Evidence at macro- and micro-economic level indicates that declining nutrient efficiency is one of the main limitations for agricultural development in Ethiopia. Policies and strategies for sustainable intensification of resource management in the northern Ethiopian highlands need to focus on critical bottlenecks, like the timing of sowing and input applications, the reduction of moisture stress (ponds) and the control of erosion. The latter measures are only effective when complementarities are considered (e.g. between SWC and fertilizer use). Policies directed at better fertilizer provision combined with credit services and extension can be effective to improve farmers' income and soil nutrient balances.

List of available working papers

2002-01	Kruseman, G., J.Pender, G.Tesfay and B.Gebremedhin,*Village stratification for policy analysis: multiple development domains in the Ethiopian Highlands.*
2002-02	Kinfe Abraha Weldemichael, *Public and private labour investments and institutions for soil and water conservation in Tigray, Northern Ethiopia.*
2002-03	Boetekees, S. *Rural credit and soil and water conservation: a case study in Tigray, Northern Ethiopia.*
2002-04	Kruseman, G., R.Ruben, G. Tesfay. *Diversity and Development Domains in the Ethiopian Highlands.*
2002-05	Meijerink, G.W. *Alternative cropping practices in Ethiopia: A literature review*
2002-06	Meijerink, G.W. *Rural livelihoods and soil conservation in Eastern Tigray. A Rapid Diagnostic Appraisal Report for Gobo Deguat and Teghane*
2003-07	Mulder, H. *A qualitative and quantitative assessment of soil nutrient management in Tigray.*
2003-08	Mosugu, M.E. *Impact of current and alternative land use scenarios on soil erosion in Eastern Tigray: A catchment scale study*
2003-09	Hengsdijk, H. *Technical Coefficient Generator for Land Use Systems in Tigray*
2004-10	Kruseman, G. *Village level (dis-)incentives for investment in sustainable land management: interactions between households, communities and the environment.*
2004-11	Kruseman, G. *Long-term Bio-economic modelling for the assessment of policies for sustainable land use in less*

DISCUSSION

Q: What do you mean by tenure insecurity?

A: Tenure insecurity does not necessarily mean ownership but also includes long-term rights. Besides land, the ownership of trees on a plot of land or the installation of SWC measures could improve the sense of ownership. With the exclusive attention for land tenure, the importance of ownership on other land-linked assets is sometimes overlooked.

Q: Since Tigray is known for minimal fertilizer use over time and given the fact that there is more fertilizer use now compared to previous periods, what are the methods employed to verify the statement "fertilizer use efficiency is declining in Tigray"?

A: Fertilizer use efficiency is measured by dividing the yield by the amount of fertilizer (effective ingredients). We used World Bank and FAO data at the country level for the aggregate calculations.

Q: If rain in Tigray is erratic as described, how is it that you recommend to fix an "appropriate sowing date"?

A: Regarding timing we can only rely on weather forecasts. Forecasting rainfall is still in its infancy, you cannot go beyond probabilities. There is, however, a large body of indigenous knowledge with farmers on this issue.

Q: Why did your simulation only focus on a single water harvesting technology; i.e., (household) ponds? There are different types of ponds; e.g., community ponds and other types of water harvesting technologies such as ground water harvesting, spot irrigation, etc. Why did you not include these alternatives? How did you get your data for the performance of ponds?

A: We wanted to compare water management strategies at household and village level to assess their effectiveness. We simulated the effect of ponds on the reduction of local moisture stress. Based on these simulations, ponds are the preferred alternative compared to micro dams.

Q: The picture you painted about the future outcomes (2010) in agricultural yield was rather bleak, particularly if "business as usual" continues. This suggests that radical changes in the pattern of interventions are required. However, your analysis subsequently explores the impact of interventions such as water harvesting and increased fertilizer use, which I consider as elements of the "business as usual" scenario. Why are more radical shifts in policy (such as promotion of irrigation and changes in product mix) not explored by your analysis?

A: In this study we cited generalizations at the national level of soil and water conservation activities. In the local assessment, we used detailed simulation models to identify suitable

investment and management strategies. Comparing the options of a single strategy proved not to be the best way out, therefore simulations are made to assess the effects of certain ‘packages’. We showed that investment in SWC activities would only yield tangible results when combined with improved input use and better management of land and water resources. Similarly, water harvesting can be made far more effective when appropriate institutional measures are taken. Radical investment strategies are not likely to result in dramatic yield increase, and perhaps there is more room in fine-tuning a number of currently used (but isolated) practices towards an integrated strategy.

AGROECOLOGICAL ANALYSES: PRODUCTION POTENTIALS FOR TIGRAY REGION

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INTRODUCTION

Crop growth simulation approaches can be used to assess the production potential of different types of crops and cropping systems, and to identify the constraints to agricultural production under particular circumstances. We used this approach in northern Ethiopian villages in order to get insight in the existing margins for yield improvement (or enhanced certainty on yields) through better crop and land management practices or input application. In addition, this approach permits us to understand the role of appropriate measures for controlling soil erosion and reducing moisture stress.

The paper is structured in three parts. First, the underlying principles of the crop simulation model WOFOST are outlined. Specific attention is given to the soil and weather factors that influence yield levels. Second, the consequences of rainfall variability for crop yields are discussed in order to identify possible options for reducing moisture stress. Differences in sowing dates appear to be of critical importance for potential yield levels. Third, the role of soil and water conservation (SWC) measures for maintaining or increasing crop yields is outlined. The interactions between SWC measures under different sowing dates are found to exercise a major influence on crop yields.

CROP GROWTH SIMULATION

The World Food Studies (WOFOST) crop simulation approach has been developed in the 1970s as an analytical framework for understanding the functioning of plant systems. Subsequently, the model has been applied to explore production potentials at field and regional level. The WOFOST model provides a generic framework for analyzing multiple crops under various soil and weather conditions.

The concept of crop growth simulation is based on a number of general principles. First, the potential yield is calculated considering crop characteristics and weather (rainfall, temperature, radiation) conditions. Secondly, yield limiting factors can be identified, taking into account valid limitations regarding water and nutrient availability. Third, yield reducing factors related to pests, weeds and disease incidence explain the actual yield level. These limitations can be analyzed throughout the cropping cycle (daily growth) and usually lead to lower yield levels in particular periods of the agricultural calendar.

The different modules that form part of the WOFOST model include data on soil characteristics (water content, root depth), weather profiles (temperature, radiation, vapor pressure, wind and\rainfall), soil-water balances (evaporation, surface run-off and storage, groundwater depth, percolation, etc) and transpiration reduction (water content at field capacity).

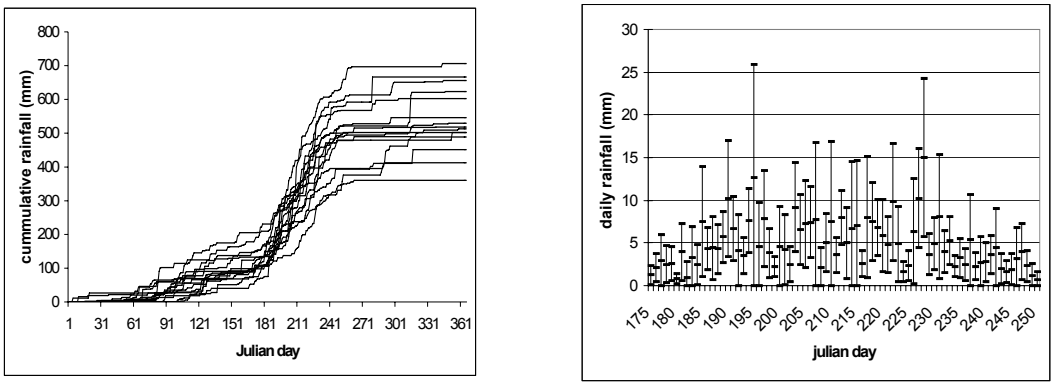
The WOFOST model can be used to analyze yields of a wide range of crop varieties. The standard crop file includes 45 crop parameters, including 14 parameter tables where yields are estimated as a function of crop age and temperature. Given the extreme vulnerability of cropping systems in the northern Ethiopian highlands, we paid particular attention in this study to the timing of activities, e.g. the start of the cropping season and the input applications throughout the agricultural cycle.

Some limitations of the WOFOST model need to be acknowledged. Some yield losses (due to cold and heat stress, frost damage, damage by hail and strong winds, excess flooding) are not included in the model. Since the model is based on a multi-parameter approach, calibration and validation sometimes meet major difficulties. In addition, some empirical relations are not fully understood yet. The model provides therefore usually better results in near optimum growth conditions. It proved to be rather difficult to quantify severe stress conditions.

RAINFALL VARIABILITY

Annual rainfall conditions in northern Ethiopia (using data from *Gobo Deguat* village) have been analyzed over a period of 25 years and compared with the pattern found in The Netherlands. Average rainfall is relatively low (538 mm/year) with a coefficient of variation of 18 percent. Even while these absolute data are not very different from the situation in The Netherlands, the distribution pattern of rainfall in northern Ethiopia is far more concentrated (see Figure 1).

Figure 1--Rainfall in Gobo Deguat



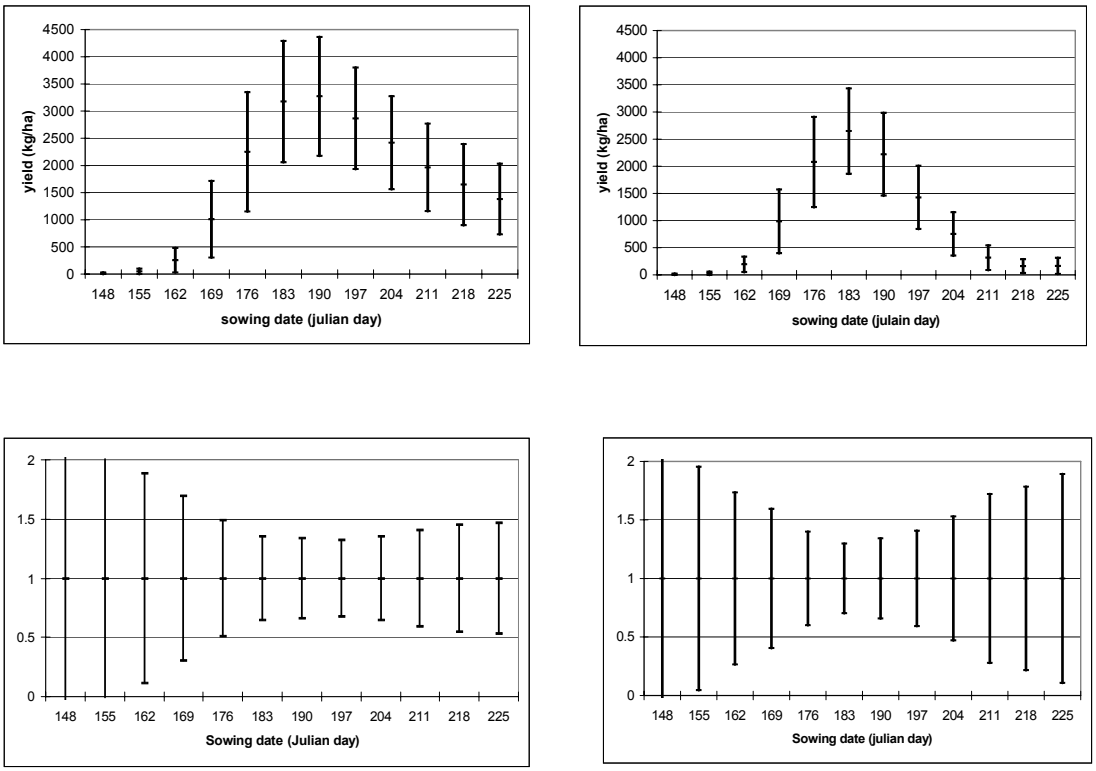
In addition, the analysis of daily rainfall during critical periods of the cropping cycle (Julian days 175-250) indicates that the variability of rainfall in Gobo Deguat is rather high. Looking at the longest sequence of days without rainfall during these critical days, we observed

in northern Ethiopia in some extreme years a period of 10-15 days without rain during the rainy season (compared to the maximum of 20-25 days in The Netherlands).

Rainfall characteristics in northern Ethiopia (Gobo Deguat village) are thus not so much characterized by high inter-annual variation (at comparable rates of The Netherlands) or intra-annual variation (ibidem.), but typically include a large number of days without any rainfall and a rather short growing season. In addition, rainfall intensity is very high, occasioning high run-off and erosion. Consequently, the selection of appropriate sowing days is considered of critical importance to take maximum advantage of the rainfall season.

In such circumstances, soil conditions have an important impact on the yield potential. Comparing barley yields on two different soil types (plain and terrace) and simulating yields at different sowing dates indicates that substantially higher yields can be reached in plain areas, in particular during the optimal sowing period. More importantly, the relative certainty regarding yield levels is far more decreasing for the sloping soils at sub-optimal sowing dates (see Figure 2).

Figure 2: Barley yields and confidence intervals on plain and terrace soils and for different sowing dates



2% slope

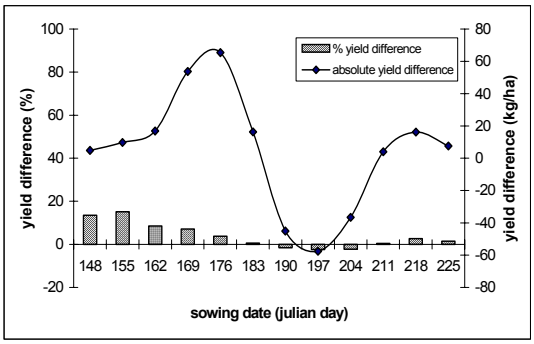
40% slope

We may conclude from these simulations that in the northern Ethiopian highlands water-limited yields are still considerably higher than actual yields. It should be noted, however, that the accuracy of this result still depends on the assumption of optimal nutrient delivery and crop protection. Timing of sowing appears to be a most critical factor for reaching the yield potential. Providing support to farmers for selecting optimal sowing dates will therefore be an important device. The variation in yields is especially dependent on the soil type. Soil classification categories used by farmers can be appropriate for identifying targeted measures. In addition, SWC measures can be used to approach the yield potential.

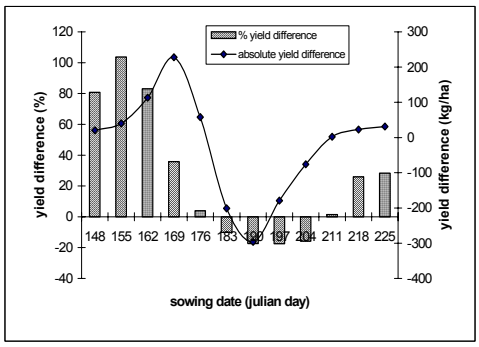
SOIL AND WATER CONSERVATION

The effects of soil and water conservation measures (bunds) for barley yields have been simulated for two different soil types (plains with 2 percent slope and terraces with 40 percent slope) under different sowing dates. Advised bund spacing at plains and terraces of 20 and 5 m was maintained. Results indicate that bunds provide a limited yield gain on plain soils, but this effect almost disappears at more optimal sowing dates (see Figure 3). Similarly, on terraces the yield gain tends to be high at sub-optimal sowing dates, while at the optimum sowing date some yield reduction is even registered (due to the reduction of the net cropped area).

Figure 3--Effects of bunds on barley yields at different sowing dates



2% slope



40% slope

These results seem to confirm the importance of sowing date selection. Similar analyses of wheat yields under different run-off fractions and at different sowing dates illustrate the fact that run-off is particularly high at sub-optimal sowing dates. At optimal sowing dates, the overall effect of soil bunds on yields is rather limited, mainly due to the area reduction. This is particularly relevant in sloping areas where small distances of bund spacing are maintained. The decrease in run-off clearly shows a non-linear effect on yields; since bunds allow earlier sowing and permit a longer cropping season, most effects are registered at early sowing dates. It should

be noted here that some other possible effects of soil conservation structures, like increased nutrient availability, increased rooting depth or changed incidence of pests and diseases are not accounted for in this analysis.

CONCLUSION

The study confirms the fact that there is still a potential for improving yield levels in northern Ethiopia, since current production levels are below the attainable yield. Improving yields requires, however, that nutrients and biocides are available in the required amounts. Optimizing yields is most dependent on the selection of the optimal sowing date; early sowing strategies or extension of the growing season (through supplementary irrigation) provide suitable options. The use of soil bunds has limited (and sometimes even negative) effects on water-limited yields. Using bunds at early sowing dates makes crops more sensitive to lower run-off.

DISCUSSION

Q: In the simulation results presented, the effects of water availability are influenced by land slope, run-off, etc. Did you compare barley yields of improved vs. local varieties and short-maturing vs. long maturing varieties? The role of research and technology selection in this respect is important, and implications are expected from such an analysis.

A: In the presentation, only the result from one variety are reported but when calculating technical coefficients we used different varieties and assessed the relevant differences. Variety choice in relation to the cropping season is an important criterion for farmers.

Q: You have mentioned that factors other than water affect production and productivity in Tigray. What are these other factors?

A: In semi-arid areas the ultimate constraining factor is water. But in the rainy season water is available, and therefore much can be gained by improving other factors like plant nutrients, biotic effects (like weeds), pests and diseases.

Q: You said water is not a limiting factor in Tigray. I do not understand or agree with this conclusion. "Limiting factor" is a relative concept and currently the limiting factor is water. Please comment also why you said that there is negative effect of SWC structures in Tigray. I do not agree with this conclusion, since it contradicts with the conclusions of many other research results.

A: The results are based on the model used and the assumptions are clearly specified. We wanted to illustrate that water scarcity is very much related to other decisions, especially regarding timing of sowing. Our results can also be helpful to understand the rationality of SWC as a second-best solution under conditions of sub-optimal sowing dates.

Q: Perhaps the depth of the soils you are considering is not representative. How much can increasing the organic capacity of the soil improve yields?

A: Improving the organic matter will increase the infiltration capacity to reduce run-off and will help in moisture storage. But one needs to increase also the nutrient availability to quantitatively improve the effect on yields.

Q: (i) When you make statements concerning soil fertility and rainfall you should quantify the relativeness because things differ from place to place (even in dry areas) so we should not generalize. (ii) I'm not comfortable with the statements about planting dates because rain onset is

very erratic and farmers do not have a time set for sowing, they respond to rain so this should be clarified.

A: We agree with the observation that many results are highly location-specific. However, the observations regarding optimal sowing dates may be helpful in the efforts to design appropriate extension services. Farmers' expectation regarding rainfall are based on earlier experiences and may be oriented towards risk-reduction. They may prefer lower yields (at higher certainty level) instead of higher yields (with more associated risk).

Q: Have you captured the important parameters like the evaporative demand of the atmosphere and the resulting length of growing period in addition to the rainfall parameters considered when validating the model to the study area?

A: We have included the evaporative demand in the model simulations.

SOIL NUTRIENT FLOWS AND INTEGRATED NUTRIENT MANAGEMENT IN THE NORTHERN ETHIOPIAN HIGHLANDS

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INTRODUCTION

This study presents a nutrient flow approach for analyzing the inflows and outflows of nutrients at field and farm level, in order to evaluate the sustainability of agricultural systems in northern Ethiopian villages. Nutrient flows are considered for three different types of households defined according to their wealth status. We used the NUTMON model approach for evaluating the nutrient flows and related these flows to soil nutrient stocks.

The presentation is structured in five parts. First, the literature regarding soil nutrient depletion in Eastern Africa is briefly summarized. Second, the empirical procedures for plot sampling and household stratification are outlined. Third, the analytical framework of the NUTMON approach is discussed. Fourth, the results are presented and relationships between stocks and flows are analyzed. Finally, we discuss the options for addressing the nutrient deficits through integrated nutrient management.

NUTRIENT DEPLETION

The status of soil nutrients in agricultural systems is – to a great extent – determined by physical, chemical and biological processes in the soil, which are affected in turn by climate, topography and farm management.

Several studies are available regarding land degradation in the East African Highlands, focusing on nutrient losses caused by erosion and run-off. Recently, the removal of yields and crop residues has been identified as a major cause of nutrient depletion. Earlier studies by

Stoorvogel and Smaling (1990) indicated that Ethiopia is one of the countries with the highest rate of nutrient mining, with aggregate figures of –41 Kg of N, - 6Kg of P and –26 Kg of K per ha. Other studies still register far higher rates of NPK depletion in specific areas, particularly amongst better-off farmers. Our study will focus attention on differences in nutrient depletion rates among farm households in the Tigray region.

MATERIALS AND METHODS

We studied nutrient flows and stocks amongst a sample of 24 households in *Teghane* village (*Atsbi-Wonberta* district), an area of 14 km^2 located in Tigray at an altitude of around 2750 m.a.s.l. A detailed assessment was made of the relief, geology and land cover in the region, distinguishing between four groups of soil units.

Farming systems are based on annual food crops (barley and wheat as main crops, field pea and faba bean as secondary crops) and cattle holding (cows, sheep, donkeys, poultry). Crop cultivation takes place on the better lands, while grazing lands are located in the valley bottom where water logging is a serious limitation for crop growth.

We collected data from a sample of 24 households, divided into three groups: relatively "rich" (5 households), "medium" (7) and "poor" (12). The proportional stratified random sample was based on a stratification of households according to oxen ownership and land holding size. "Rich" farmers produce enough grain for consumption and planting, while poor farmers have to rely on external purchase.

NUTMON APPROACH

The NUTient MONitoring (NUTMON) framework was used for collecting and processing field data. Inputs and outputs of NPK were quantified at field and farm scale, including internal flows between farm activities and external flows to/from the market and the environment. Since farming systems in the village are strongly subsistence-based, internal flows (e.g., manure used on crop fields; crop residues used to feed cattle; household waste to fields, etc.) are very important. Use of inorganic fertilizers is, on the other hand, quite limited, while most farmers rely on compost and manure for maintaining nutrient supply. We also paid attention to the household energy needs.

The core parameters of the NUTMON framework are presented in Figure 1. The main inflows of soil nutrients are from organic and inorganic fertilizers and internal transfers; the main outflows are crop yields and residues, erosion and run-off, and leaching. The topsoil layer nutrient characteristics are used to estimate soil nutrient content.

Table 1--NUTMON Approach

IN flows		OUT flows		Internal flows	
IN1	Inorganic fertilizers	OUT1	Harvested products	FL1	Feeds
IN2a	Organic inputs: manure and feeds	OUT2	Crop residues and manure	FL2	Household waste
IN2b	Organic inputs: manure from grazing outside the farm	OUT3	Leaching	FL3	Crop residues
IN3	Atmospheric deposition	OUT4	Gaseous losses	FL4	Grazing of vegetation
IN4	N-fixation	OUT5	Erosion	FL5	Animal manure
IN5	Sedimentation	OUT6	Human excreta	FL6	Farm products to household

RESULTS

The NPK contents of soil stocks are compared to the NPK in- and outflows for the three categories of farm households. Much of the inflows are from organic fertilizers (compost) with a relatively low NPK content. Internal transfers account for more than 90 percent of NPK use for all farm categories, but the level is substantially higher for wealthy farmers (247 kg/ha) compared to medium (147 kg/ha) and poor (136 kg/ha) farmers. The same holds for outflows from farm fields related to removal of crop products and animal feed, where NPK removal is highest for wealthy farmers (437 kg/ha) compared to medium (193 kg/ha) and poor (165 kg/ha) farms. These differences are all statistically significant at a 0.05 level.

The comparison between NPK flows and stocks indicates that highest relative loss is registered for wealthy farms, in particular for K (8.8 percent/year). Losses in N range between

0.6 and 0.4 percent, and for P between 0.17 and 0.01 percent (see table 2). These rates are substantially higher than those found in earlier studies for Ethiopia.

Table 2--Nutrient stocks and depletion rates in Teghane (2002)

	Rich	Medium	Poor
Total N stock (kg/ha)	16340	8164	5907
N-flows (Kg/ha/yr)	-103.4	-36.2	-21.8
N-flows (% of stock/year)	-0.63	-0.44	-0.37
Total P stock (kg/ha)	7037	6202	6758
P-flows (Kg/ha/yr)	-11.7	-3.5	-1.0
P-flows (% of stock/year)	-0.17	-0.06	-0.01
Total K stock (kg/ha)	1288	1040	800
K-flows (Kg/ha/yr)	-113.4	-41.8	-27.5
K-flows (% of stock/year)	-8.8	-4.0	-3.4

Depletion rates of N and K are found to be strongly related to nutrient stocks ($R^2 = 0.83$ and 0.85 respectively for N and K). The situation for P is more complicated and no trend could be identified.

INTEGRATED NUTRIENT MANAGEMENT

The high nutrient depletion rates found in *Teghane* village are related to the current farm management techniques. The history of settlement of farmers in the northern highlands passed through a sequence where agricultural systems have long been supported by natural fertility, but this practice is threatened when sedentary farming and increasing population density reduced fallow periods and limited recovery of natural vegetation.

In the current situation, there is an urgent need for integrated nutrient management, based on improved land use planning and closing loops of manure and nutrient recycling. In *Teghane* village, about 43 percent of the area under Leptosols is less suitable for cultivation but currently used for cropping. These sections need to be closed and are better used for forestry. The firewood supply from these fields will assist to change the direction of manure flows from household energy use to the farm fields.

In addition, better closure of the internal manure and compost flows could be helpful to enhance their use as nutrient sources for plant growth. The NPK content of these components is, however, fairly low. Long physical storage reduces the benefits derived from compost and manure. However, these flows are important for improving soil structure and enhancing moisture retention.

CONCLUSION

The study clearly confirms that soil nutrient losses are an important cause of soil degradation in northern Ethiopia. There is also a positive relationship between farm size and nutrient losses. This does not imply, however, that farm management systems are better amongst the poor. Cultivated fields of wealthier farmers are generally of better soil quality, apply more inputs and SWC practices and reach higher yields (due to better seed material and adequate timing). The combination of better soils and inputs results in more nutrient removal as a result of larger harvests.

High rates of nutrient depletion could be addressed by introducing land use changes, improving organic fertilizer management and its quality, and improved timing of fertilizer applications. A small increase in chemical fertilizer use could substantially enhance the efficiency of organic fertilizers.

It should be noted that the NUTMON procedure may underestimate certain nutrient flows, particularly those related to manure use for household energy. Moreover, some manure and compost end up as non-returnable sinks or might be exported. Finally, changes in the livestock herd size need to be better incorporated into the NUTMON methodology.

DISCUSSION

Discussant's comments by *Dr Kidane Georgis, EARO*:

The study is considered highly relevant. Nutrient removal by crop yield is relatively small compared to crop residue and roughage. Major soil types, relief, geology and land use are explained well.

A comment on the methodology used: definitions of nutrient inflow and outflow are not specified, but all the results are based on this. Compared to farmer's category in relation to nutrient inflow and outflow, it would be important to clarify the materials and methods.

The sampling technique needs further clarification; is a proportional stratified random sampling technique used?

The paper has stated important drawbacks of the model. Given these drawbacks, it will be difficult to rely on the recommendations.

Farmers continue to deplete soil nutrients as long as the land provides sufficient food and cash to make it through the year. Mining could be observed, but when soil fertility is still acceptable, crop production will remain to be high. In other words, as long as the soil is able to buffer the negative balances before reaching low levels of nutrient availability, farmers will not notice the change. The nutrient balance alone is therefore not sufficient as an indicator of soil productivity. It needs to be linked with soil nutrient stocks, either with the total stock or with stock of available nutrients.

Nutrient balances may reflect many factors because they are based on aggregation of four or more inputs and outputs:

- Inputs: Mineral fertilizer, organic inputs, atmospheric disputative, BNF, sedimentation
- Out flow: Harvest product, crop residue removal, solute leaching, gaseous losses, runoff and erosion.

Some of the inputs discussed in the paper can be measured--e.g. mineral fertilizers and organic inputs--but there are some inputs that are difficult to measure, such as biological nutrients, sedimentation, etc., so it is important to quantify these.

Good references have been used for the study however models need to be chosen wisely given the specifications.

Integrated nutrient management is recommended but chemical fertilizers need to be used as well. Although there is controversy on the use of chemical fertilizers, my personal view is that chemical fertilizers need to be used with water harvesting techniques to get results. For instance although crop rotation, intercropping, and legume planting are practiced, nutrients like the phosphorus base in soils is so low that the legumes cannot fix the nitrogen in the soil without the sufficient phosphorous required. Therefore the use of fertilizers is essential.

Other questions: Why is the analysis based on social differentiation i.e. rich, medium and poor farmers? It is better if done by farming system or management practices or cropping systems, for strategic recommendations or interventions.

Impacts of Policy and Livelihood Strategies for Poverty Reduction and Sustainable Land Use in Tigray: Results of a Bio-Economic Model

Gideon Kruseman
Wageningen University and Research Centre, The Netherlands

INTRODUCTION

This presentation presents an overview of the bio-economic modeling framework used to identify feasible resource use strategies for improving farmers' welfare, and the appropriate policy incentives required for enhancing their adoption. We synthesize the findings from a number of more detailed studies which focus on issues of land and water management, soil and water conservation, and nutrient efficiency as key elements of strategies towards sustainable intensification in highland areas.

The study relies on an integrated bio-economic modeling framework for the simultaneous assessment of income effects and changes in soil nutrient balances under different conditions of market and institutional development. This approach has been validated and applied for the northern Ethiopian region of Tigray. Based on a detailed assessment of local environmental conditions and an inventory of locally-specific technological options, alternative resource use strategies have been identified. Farm household models are used for the economic appraisal of these strategies. The simulation results provide insight into the range of possible options and instruments for stimulating sustainable rural development in the northern Ethiopian highlands.

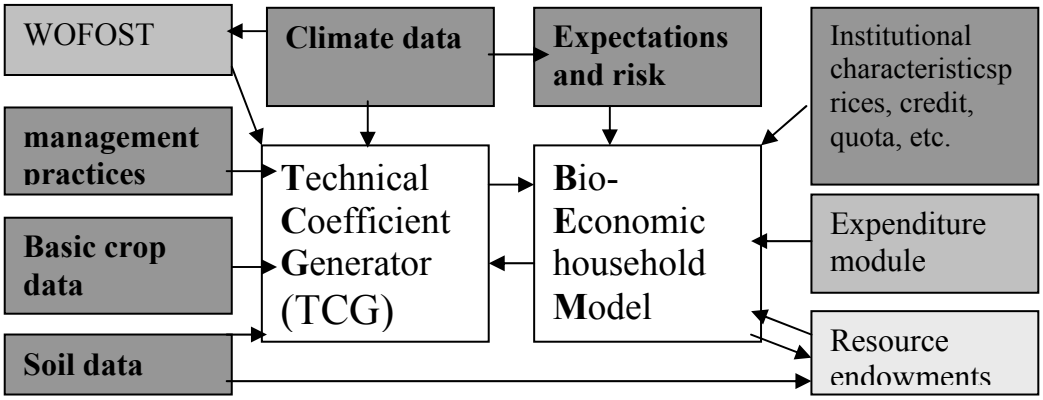
BIO-ECONOMIC MODELING APPROACH

The analysis is based on an interdisciplinary modeling framework where biophysical processes influencing biomass growth are related to socio-economic behavioral processes of farm household decision making. The model consists of separate modules for generating a range

of technical coefficients (TCG) and other sets of information for analyzing farm household decisions and preferences (see Figure 1).

The biophysical side of the model relies on crop, climate and soil data to identify potential yields and nutrient balances under different management regimes. The economic part is based on an inventory of resource endowments, coefficients of risk behavior, and expenditure analysis of representative types of farmers in Tigray region.

Figure 1--Bio-economic modeling framework



This analytical framework enables a quantitative assessment of farm-households' decisions regarding crop and technology choice within certain biophysical boundaries (soil quality, rainfall) and socio-economic constraints (access to resources and availability of inputs and credit). The model simulations can be used to identify new and promising technologies regarding their potential implications for farmers' welfare and soil nutrient balances, and for the appraisal of the effectiveness of different types of policy instruments as incentives for enhancing farmers' adoption of these alternative land use strategies. In addition, it proved to be helpful to support policy targeting towards particularly vulnerable villages or households.

SOIL DEGRADATION

Natural resource conditions in the selected study villages in northern Ethiopia (Gobo Degaut and Teghane) are characterized by fragile soils and irregular rainfall. Physical soil degradation is mainly caused by gully erosion that gradually reduces the amount of arable crop land, while sediments are accumulated in lower areas. Soil chemical properties are also suffering degradation. Soil nutrient mining leads to a gradual reduction of soil nutrient stocks, thus affecting soil fertility and reducing nutrient uptake efficiency.

The northern Ethiopian highlands can be characterized as a less-favored region in terms of various development domain dimensions. The simultaneous occurrence of low agricultural potential, adverse agro-climatic conditions, poor market access and relatively high population density makes it extremely difficult to identify strategies for overcoming these constraints.

The low and variable rainfall and the short crop growing season are considered as major biophysical constraints. In addition, soils in the region are intrinsically poor and suffer from a long history of degradation. The high relative and absolute population density, combined with poor access conditions and the scarcity of non-farm employment opportunities, represent major socio-economic constraints.

BIOPHYSICAL OPTIONS

Given the fragile biophysical environment, critical attention needs to be given to the interactions within current farming systems, in particular between soil nutrients and crop management strategies, and between crop and livestock components. Due to erratic rainfall conditions, stochastic shocks could easily lead to strong reductions in biomass production or even complete crop loss. Therefore, the underlying dynamics of major cropping systems is

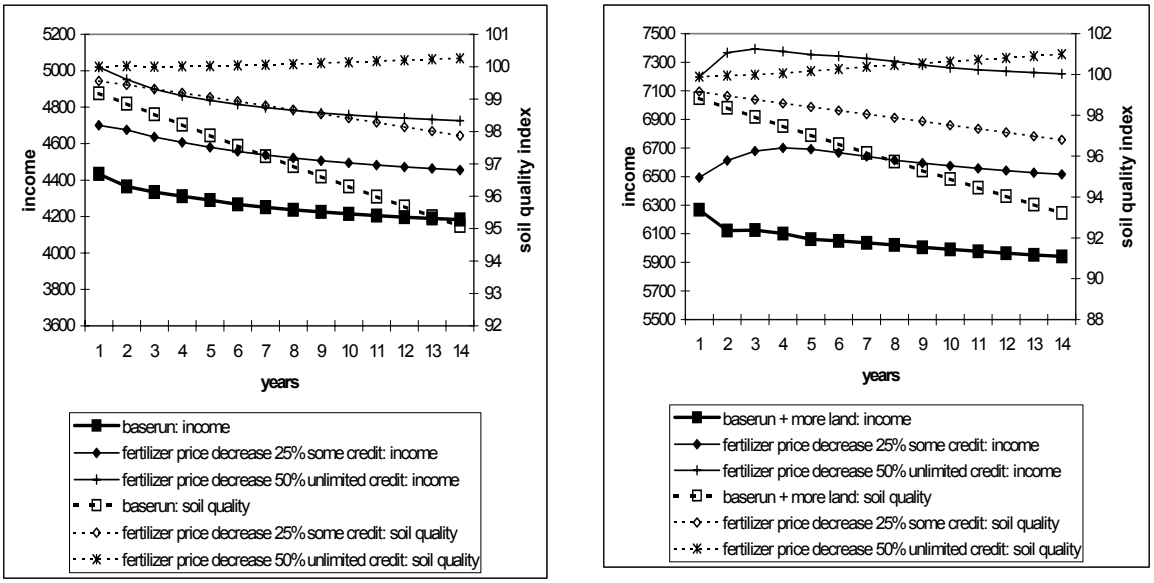
analyzed in detail in order to identify which management factors could lead to improved nutrient uptake efficiency.

The agroecological crop simulation approach pioneered by C.T. de Wit proved to be useful to reach insights into the interactions between nutrient uptake and crop management. Complementarities between nutrient supply and labor availability are introduced to account for the effects of multiple fertilizer applications. Selection of optimal sowing date proved to be critical for the attainable yield level. The nitrogen dynamics of chemical and organic fertilizers is analyzed in detail using the Wolf (1989) model, which considers the available N for plant growth from different sources.

POLICY OPTIONS

Different strategies for improving agricultural yields in Tigray region have been analyzed with the simulation model. We present here three typical scenarios under conditions of 25-50 percent lower fertilizer prices, increased availability of arable land (e.g., through emigration), and increasing options for off-farm employment. Results are presented for the development of farm-household income and soil quality over a period of 15 years (see Figure 2).

Figure 2--Scenario results for fertilizer prices and farm land increase



The scenario results indicate that improving fertilizer prices (or reducing the input/output price ratio through more efficient input delivery) only generates positive effects for the natural resource base at a very high subsidy rate. Lower fertilizer costs do permit farmers to stabilize their income at a higher level. Improving the average availability of land has substantially stronger short-run income effects and could promote farmers' adoption of improved soil management practices. The same holds for better off-farm employment opportunities, which could reduce the current resource constraints.

CONCLUSIONS

The scenario results indicate that – given the fragile resource base and erratic rainfall conditions – reliance only on inorganic fertilizers is not sufficient to improve nutrient uptake efficiency. Availability and adequate use of chemical fertilizers, and their application on the right moment of the crop growth cycle, still offers options for improving yields at an acceptable rate

of return. In addition, engagement in off-farm activities – including food-for-work programs – is an important device for reducing farm household cash constraints.

DISCUSSION

Discussant's comments by *Dr. Berhanu Gebremedhin*, ILRI:

You have used a large number of factors and variables in the model. This will make it difficult to use such bio-economic models to identify critical constraints. Given the characteristics of less-favored areas which are usually low-productive, we need to be able to focus interventions. Interventions in less-favored areas should not be blanket applications of fertilizer; in some places such blanket application may work, and in other places it may not work. The impact of fertilizer use should be therefore compared to the use of compost, terraces, bunds, etc.

The study has focused only on nitrogen, whereas phosphorus has also important functions and needs to be considered. Also leisure is left out from the study, while local farmers use many religious holidays.

Finally, farmers also need other interventions like investment outside agriculture for enabling them to increase their income and market diversification.

Other questions

Q: Why have livestock not been fully considered in the study?

A: We had more available data on crops and not livestock. Revenues and manure from livestock are included. Most livestock in the region are maintained for purposes of animal traction (land preparation for crops) and as a security device. The bio-economic model is less suitable to address the latter kinds of issues. The model is used to analyze specific types of constraints.

Q: It was mentioned that other options other than agriculture are viable. What are those options?

A: We analyzed the effects of infrastructure improvements and reduced investment constraints on input use and yields. The impact on the reduction of fertilizer prices in remote areas proved to be most important.

SESSION III: PERFORMANCE OF GRAIN MARKETS

Structure and Conduct of Grain Marketing in Ethiopia

Wolday Amha and Eleni Gabre Madhin

Characterizing Grain Traders

Eleni Gabre-Madhin and Wolday Amha

Spatial Efficiency of Maize and Wheat Markets in Ethiopia

Asfaw Negassa, Robert Myers and Eleni Gabre-Madhin

STRUCTURE AND CONDUCT OF GRAIN MARKETING IN ETHIOPIA[2]

Wolday Amha[a] and Eleni Gabre-Madhin[b]
[a]Association of Ethiopian Micro-Finance Institutions (AEMFI), Ethiopia
[b]Internatiional Food Policy Research Institute

STATEMENT OF THE PROBLEM

Ethiopia's agriculture is largely characterized by subsistence farming. Smallholder farmers operating on, by most estimates, an average of one hectare, account for about 95 percent of the agricultural output. Agricultural production and productivity is very low and the growth in agricultural output has barely kept pace with the growth in population.

Cereal production accounts for about 88 percent of all crop production in Ethiopia. Teff, maize, sorghum, wheat and barley account for 95 percent of this output. In times of good weather, roughly 75 - 80 percent of the annual output is consumed at the household level. According to the CSA estimates, production of food crops in 2000/2001 was about 9.4 million tons. Compared to 1999/2000, production of food crops in 2000/2001 increased by 19.9 percent. The major reasons for the increase in production was the well distributed and extended rainfall up to mid-October which compensated the absence of rain during the Belg season and also delay on the onset of the main season rain. In addition to the non-occurrence of pest and disease, the intensive delivery of extension services (particularly inorganic fertilizer and improved seeds) contributed for the increase in production which was observed in all regions. Due to the thin markets, this has resulted in a significant decline in the prices of food crops. However, in 2001/2002, production of food crops declined by 11.4 percent and the prices of food crops increased significantly. Currently, the country is suffering again form a serious drought. It is

[2] Based on the background paper, "An analysis of the structure, conduct, and performance of the Ethiopian grain market," by Wolday Amha and Eleni Gabre-Madhin, IFPRI 2003 (mimeo).

estimated that 15 million people require food aid. In both cases (surplus and deficit production), marketing of agricultural products is one of the main challenges facing the producers, traders and other market participants.

The high potential areas of Ethiopia can produce enough food to meet the needs of the people in the food deficit areas. However, owing to *inter alia* poor communications and transport infrastructure and the lack of storage and other marketing facilities, people living in food deficit areas continue to face famine and food insecurity while producers in surplus regions endure unattractively low producer prices. Thus, as the country increasingly becomes a liberalized market economy, the efficiency of the grain markets assumes ever-increasing importance. Largely because of frequent droughts, the role of the market in promoting sustainable food security has increasingly become one of the most important priorities in the country's poverty reduction efforts. Gabre-Madhin (1999) indicated that improving cost effective transfer of grain from surplus to deficit region is required to improve the food security situation in Ethiopia. In 1995/96 and 2000/2001, output prices in remote areas have tended to be too low in comparison with the cost of farm inputs thereby eroding household incomes and diminishing the long-term profitability of smallholder agriculture.

Agricultural marketing is the main driving force for economic development and has a guiding and stimulating impact on production and distribution of agricultural produce. The agricultural marketing system takes an increasing importance as a traditional agrarian society is transformed into a modern industrial society. The increasing proportion of the population living in urban centers and rising level of income requires more highly organized channels for processing and distributing agricultural products. Agricultural marketing acts as an agent of rural development in two ways. Firstly, by ensuring a high enough price to the producer, marketing

serves as an incentive to the supply side. This is an incentive to increase the supply of agricultural products. Secondly, by getting a low enough price to the consumer it works as an inducement on the demand side. The lower consumer price increases the demand for agricultural products. A proper marketing strategy will bring the producer in contact with the highest bidder thereby getting him the highest price. Similarly, it can ensure the speedy distribution of the agricultural produce by eliminating wastage and improving competition. Moreover, agricultural marketing will play a coordinating role, steering supply and demand with respect to place, time and form utilities. The above two factors (decreasing consumer prices and increasing producer prices simultaneously) can be realized by improving the performance of the agricultural marketing system which reduces the marketing margins. Moreover, given the characteristics of the Ethiopian farmers, production oriented towards meeting subsistence needs, household centered decision making, risk minimizing behavior, lack of information and innovativeness, small and unstable marketable surplus, low bargaining power, relatively labor surplus and capital deficit, and seasonal cash availability, the existing agricultural marketing system is far from fulfilling its role as the engine of growth.

The weak performance of the agricultural markets (both input and output marketing) in Ethiopia has been recognized in various studies as a major impediment to growth in the agricultural sector and the overall economy. According to Bellmon analysis for 2003, the agricultural markets are extremely weak in Ethiopia, and are perhaps dysfunctional from the point of view of the farmer, the critical decision-maker in the production system who needs cash this year to buy next year's inputs as well as to meet his other living expenses (Deloitte and Touche 2002). Smallholder farmers in particular face an uncertain production environment and enormous constraints and high cost in accessing markets. The farmers also exchange with actors

who have more resources, information, options, in sum, more economically powerful agents, including unfavorable international trade regimes and markets. Moreover if the marketing system is inefficient, the surplus resulting from increased production (such as the surplus situation of 1995/96 and 2000/2001 in Ethiopia) benefits neither the farmers nor the country.

While the *derg* regime effectively destroyed Ethiopia's nascent private sector, the institutional and policy reforms undertaken since 1991 have reduced the role of the state in economic activities. However, the resurgence of a reliable private sector has been slow, exacerbated by the poor infrastructure, weak and highly fluctuating terms of trade, an inefficient input and output marketing system, the lack of market information, and inadequately developed financial markets, particularly in rural areas. As a result, farmers in Ethiopia have little influence over what they are offered with little or no bargaining power.

The continued lack of an efficient agricultural marketing system could seriously impair and jeopardize current efforts to increase agricultural production and productivity with a view to close the national food security gap and increase income per capita in line with the government strategy of Agricultural Development Led Industrialization (ADLI). Sustainable food security and poverty reduction in Ethiopia cannot be achieved without due consideration to the development of efficient agricultural markets. Well-functioning grain markets in Ethiopia should provide access to consumers, who depend on the market for affordable food supplies, and to farmers as they shift from subsistence to the commercialization of smallholder agriculture. The provision of secured agricultural markets gives the incentives to increase output and to diversify subsistence production into cash crops. Farmers tend to specialize in the production of food crops to firstly meet household needs and secondly increase household income depending on market opportunities. An efficient market for grain is generally perceived as the best institutional

arrangement for ensuring more optimal production and consumption decisions. Efficient grain marketing has also a mobilization as well as a coordination role, steering production and supply with respect to place, time, form and ownership.

Any improvement in grain marketing in Ethiopia would therefore stimulate agricultural development and overall economic growth with equity. However, such an improvement in marketing cannot be left to evolve on its own entirely. It must be nurtured through selected interventions which clearly define institutional, legal and policy frameworks that would effectively and efficiently facilitate marketing of agricultural produce. The challenge is therefore to develop an enabling environment and institutional framework that will foster the growth of efficient markets for farm produce by harnessing synergies between the private and public sectors.

This study will contribute to a better understanding on improved strategies for reorienting marketing services for the benefit of small farmer development and rural development in broader terms. However, it has to be recognized that rural markets are a part of the overall marketing system and are, therefore, directly affected by the performance of the other parts of the marketing system. An important factor for the well-functioning of rural market centers is the achievement of a high degree of linkage with the wholesale trade, particularly at the terminal wholesale markets. In these respect, it has to be recognized that wholesaling and processing play (in a well-coordinated marketing system) an important coordinating and promoting role for the smooth flow of output and agricultural input, finance, market information and other facilitating services. Moreover, horizontal coordination of market operations among rural markets is equally important in improving agricultural markets in Ethiopia.

OBJECTIVES OF THE STUDY

The main objectives of the study is to provide government, farmers, consumers, traders and other stakeholders and development partners with a better knowledge and understanding of how grain markets in Ethiopia function, and propose recommendations to improve their overall effectiveness and efficiency. The specific objectives of the entire study are:

- To identify the market structure, actors, marketing chain and conduct in the grain marketing sub-sector;
- To analyze the structure and magnitude of the transaction cost and the impact of transaction cost on market performance;
- To examine trade flows and import and export parity price bands; and
- To identify the major constraints and interventions needed to address the problems.

MARKETED GRAIN

Ethiopia has a subsistence economy where smallholder farmers produce for direct household consumption. The proportion of food grain production which is marketed is relatively small. A survey conducted by the Grain Marketing Research Project (GMRP) in 1996, excluding the volume of grain set aside for consumption, seed and feed, the total quantity of marketed grain was about 28.2 million qt, out of which about 16.3 percent of maize, 15.4 percent of wheat, 28.0 percent of teff, 12.7 percent of barley, 12.8 percent of sorghum, 18.9 percent of millet, 29.8 percent of pulses and 40 percent of oil seeds in Ethiopia were marketed by small farmers. Table 1 indicates a similar pattern; the marketable surplus of teff accounts for 21.3 percent of production, followed by wheat (25.1 percent), maize (24.5 percent), barley (11.2 percent), and sorghum 8.3 percent). The marketed grain in 2001/2002 was only 17 percent of the total production in the country.

Table 1--Marketable surplus of grains in 2001/2002 production seasons (000 qts)

Type of crop	Production	Marketable surplus	Percentage
Teff	17,730.0	3,779.1	21.3
Wheat	9739.4	2,444.4	25.1
Barley	10249.1	1,148.6	11.2
Sorghum	24044.7	1,855.6	7.7
Maize	18200.3	4,467.3	24.6
Other cereals	4055.1	337.0	8.3
Total	84,018.5	14,031.9	16.7

*Based on CSA estimates (excluding pulses and oil crops).

The marketed grain varies from region to region and from year to year. Moreover, sales of grain concentrated between December and May. The largest cereal sales were observed during January. The concentration of sales in few months will result in seasonal demand peaks for finance and transport (to mobilize these marketed grains). The main reasons for selling grain in the market included the need to: (a) buy food (33.4 percent); (b) purchase modern inputs (17.8 percent); (c) avoid storage losses (12.0 percent); (d) pay loans (11.8 percent); (e) pay taxes (11.5 percent); and (f) cover wedding expenses (5.1 percent) (Wolday Amha et. al. 1997).

In our discussions with the grain wholesalers (February 2002), traders indicated that the marketed grain increased in 2000/01. Actually they indicated that maize is now flowing out of Jima, which is a new phenomenon. Investors in Bale have increased the flow of grain out of Bale. Recently, Harer seems to increase its marketed grain. Gojam has significantly increased marketed surplus of wheat.

COMPARING THE GRAIN PRICES OF ADDIS ABABA MARKET WITH IPP AND EPP

The import parity price (IPP) is the price at which imported grain would be sold on the Addis Ababa market, and the export parity price (EPP) is the price which the product would be sold on the Addis Ababa market, if it had to be exported at a competitive price (the price the exporters can get from selling grain on the international markets). This is estimated by taking the international price less the local transport costs and other costs. If the wholesale price of grain is lower than the EPP, there is opportunity to export the grain and if the wholesale price is greater than the IPP, it is advisable to import grain. The reduction in the marketing margin will reduce the gap between IPP and EPP.

The wholesale prices of grain in Addis Ababa are usually in between the IPP at the top and EPP at the bottom. In the wheat market, the wholesale prices have been lower than the IPP (annex 3) which indicates that the market deficit is entirely covered by food aid. About 24 percent of the available wheat in 2001/2002 was supplied through food aid. The significant injection of food aid has a negative impact on farmers' incentives since it has a downward effect on wheat prices. Although the wholesale price of maize in Addis Ababa market (in most of the years) is usually above the EPP, the significant increase in maize production and decline in maize prices in 1996/97 (in some regions below cost of production) resulted in wholesale prices to be lower than EPP and created a favorable situation to export maize. Around 60,000 MT was exported in the same year (Resal-Ethiopia 1999).

Moreover, after many years of being a cereal deficit country, the good harvests of 1995/96; 1996/97; and 2000/01 were accompanied by considerable falls in domestic grain prices to levels below import parity prices, suggesting that the country approached or achieved self-sufficiency in terms of effective demand. However, although sufficient grain was produced to

meet or exceed the national minimum calorie requirement the paradox is that there has not been obvious decline in the proportion of the population classified as chronically food insecure.

MARKET STRUCTURE

The structure of food grain marketing system should be evaluated in terms of the degree of market concentration, barriers to entry (licensing procedure, lack of capital and know how, and policy barriers), and the degree of transparency. Wolday's study (1994) for the Shashemene market indicated that four of the first four big traders (CR4) had 35 percent market share. The Gini coefficient for the Shashemene grain market was 0.463. About 20 percent of the licensed food grain traders in Shashemene market controlled 48 percent of the total quantity of food grain sold in the market. Gebremeskel et al. (1998) revealed that the first four big grain traders (CR4) had a market share of 33 percent. The computed Gini coefficient for the entire sample of 25 markets in Ethiopia in the report was 0.56. The Lorenz curve for the 26 markets showed that about 43 percent of the grain marketed in Ethiopia is purchased by 10 percent of the largest grain wholesalers. Although it is very difficult to identify a cut-off point of the CR4 or Gini coefficient to define weak or strong competition, Marion (1986) has indicated a CR4 of 0.4 as a critical point for collusion. Actually for the wholesale grain market in Ethiopia, where the private sector is very young, the trade concentration as measured by CR4, Lorenz curve and Gini coefficient is relatively high, indicating weak competition among wholesalers. There is a lopsided market condition where food grain wholesalers are likely to influence the grain market.

In our recent survey of the grain markets (February 2002) in Addis Ababa, Debrezeit, Adama (Nazret), and Nekmpt, and detailed discussions with grain wholesalers in these markets, there are sizable numbers of grain traders (licensed or unlicensed) and grain marketing seems to be a cooperative business. There are no restrictions to enter in the grain markets. In Ihel Berenda,

the largest grain market in the country, there are more than 1000 unlicensed grain traders and less than 250 licensed traders. From the grain traders association point of view, there are not restrictions imposed on the unlicensed grain traders. However, the association has the intention of imposing restrictions on entry into the grain market in Ihil Berenda in the future. Thus, the grain marketing system can be considered as efficient at retail level.

THE MARKETING CHAIN

Commercial grain supplies mainly come from the production of small farmers, private commercial farmers, state farmers, import, and food aid. Market participants in the market towns include wholesalers, retailers, part-time farmer- traders, brokers, agents, assemblers, processors, EGTE, and consumers. The above distinctions among traders are based on the types of actors in market towns (not on the volume of products). Moreover, it is difficult to categorize traders in the market towns due to limited specialization in grain trading. Let us define the main market participants in the market towns.

Assemblers

Assemblers are traders or part-time traders in the assembly markets who collect grain from small producers (farmers), village markets or market towns. Assembling is an essential function of agricultural marketing.

Wholesalers

Wholesalers are the major actors in the marketing channels. The wholesalers in Ethiopia could be classified into three major categories: (1) The regional wholesalers who supply grain from the surplus areas or from farmers, assemblers, or other wholesalers and sell their grain to the central markets and sometimes to deficit markets, (2) Wholesalers in the deficit market who are located in the deficit markets and purchase in bulk from regional wholesalers or from central

markets such as Addis Ababa and sell it in the deficit markets, and (3) government parastatal such as EGTE. However, sometimes this classification could be mixed. Moreover, the wholesale traders could be classified by size of the working capital, as large and small traders.

Processors

Processors are owners of grain mills (private individuals and government) who process the grain and sell their products to traders and consumers. Although small grain milling plants in the market towns provide mainly grinding services, they also function as grain wholesaling and retailing outlets in some of the market towns. Moreover, the small grain milling plants in the market towns provide cleaning services to customers. The processors are usually classified under institutional buyers, such as grain mills, restaurants, government institutions, etc.

Brokers

Brokers specialize in bringing the buyers and sellers together. They sell the products of wholesalers to other wholesalers, processors, or retailers. They disseminate price and other information to market participants and play a leading role in influencing grain trade and price formation mainly in Addis Ababa. The wholesale traders have regular telephone contacts with their respective brokers in the central markets. Brokers in Ethiopia could be divided into two categories: The first group is relatively richer with working capital of its own to provide storage services, storage space, and pay transportation cost on behalf of the regional wholesale traders, if the trader fails to sell his produce. These groups of brokers also remit the money to the wholesaler and arrange the return of empty sacks. In some cases we have observed this group being involved in wholesaling activities. The second group of brokers only facilitates the sales of grain brought to the market.

Table 2--Intermediary used for purchase and sale of grain

Intermediary	Intermediary used for purchase		Intermediary used for sale	
	Frequency	Percent	Frequency	Percent
None	328	63.6	455	88.2
Buying agent	24	4.7	4	.8
Broker	152	29.5	41	7.9
Consignment agent	6	1.2	6	1.2
Total	510	98.8	506	98.1

Source: Survey of grain and coffee traders. IFPRI/ILRI. 2002

Table 2 shows that about 64 percent of the grain traders did not use any type intermediary to purchase grain. About 88 percent of the traders did not use intermediaries during sales. About 30 percent of the grain traders used brokers for purchase while only 8 percent used brokers to sell their grain. Buying agents are used only by 5 percent of the traders during purchase. Grain traders in Ethiopia rarely use consignment agents.

Retailers

The retailers in market towns are traders who buy whole grains and sell to consumers at convenient locations and times in various forms and quantities to consumers.

The above main actors in markets interact to effect transactions of grain with one another. The process starts with the farmer who brings his produce to the market towns, usually in small quantities in sacks, bags made up of plastic fiber, leather, cloth, etc. Traders in the market towns weigh and check the quality of the produce before the trader or customer offers the farmer a price. If the farmer accepts the transaction, the transfer or transaction of the produce is concluded at the spot. The transfer of commodity in the market would also result flow of money and property right. The flow of commodities will be effective and efficient when there is smooth flow of information in the marketing system.

As indicated earlier, although farmers produce grain for household consumption, only about 29 percent of grain produced was marketed. Grain was sold through village collectors,

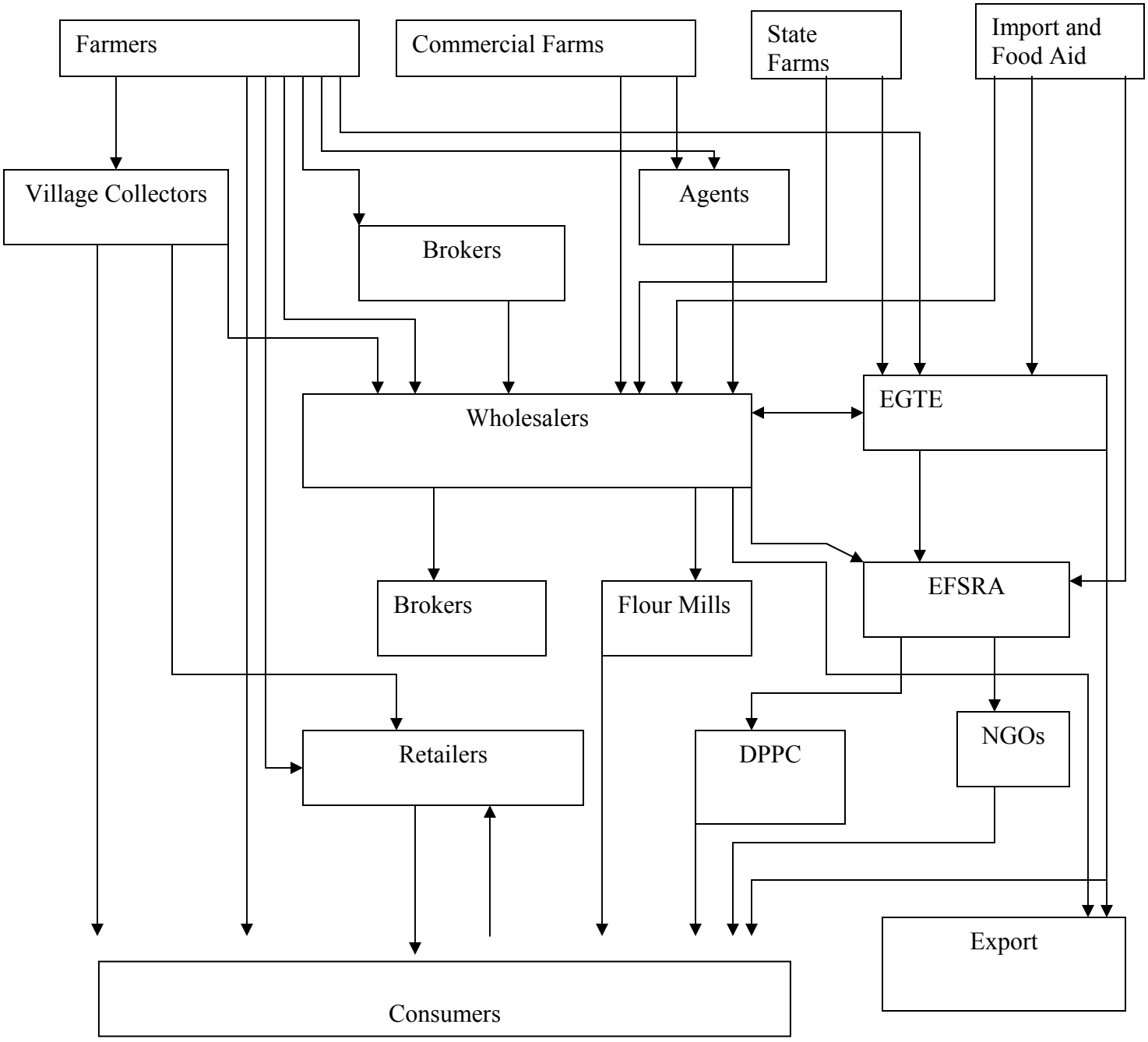
brokers, agents, wholesalers, the EGTE, and retailers to the final domestic consumers. Exports of grain were banned during the Derg administration and it was only in 1996 that the ban on exports was lifted. As a result, private traders resumed exporting grain to the Middle East and neighboring countries. Figure 1 reveals the complex network of the grain marketing channels in Ethiopia. The main transactions include:

- Producer-consumer
- Producer-retailer-consumer
- Producer-village collector-wholesaler-consumer
- Producer-village collector- wholesale-retailer-consumer
- Producer-village collector- retailer –consumer
- Producer-village collector- consumer
- Producer-agent-wholesaler-retailer-consumer
- Producer-primary wholesaler-secondary wholesaler-consumer
- Producer-wholesaler-NGOs-consumer
- Producer-wholesaler-Export
- Producer-wholesaler-miller-consumer

Although data were not available to estimate the flow of grain in each marketing channel, attempts were made by Gebremeskel et al. (1997) to estimate the flow of grain in the different grain marketing channels. That survey revealed that producers directly sold 31.4 percent of their grain to consumers. About 35.7 percent of the marketed grain was sold to inter-regional traders.

About 19.8 percent of the grain was directly sold to retailers. The remaining 12.1 percent and 1 percent of the grain was sold to assemblers and processors respectively. Actually the inter-regional traders purchased about 45 percent of the total marketed quantity and 69 percent of this was sold in terminal markets and deficit areas (Gebremeskel et al. 1998). In general, the grain transactions are conducted in conventional marketing channels in which commodities pass through a network of spot markets in market places and grain traders carry out arbitrage between market segments.

Figure 1--Grain marketing channels in Ethiopia, 2002



ACCESS TO TRANSPORT INFRASTRUCTURE

Ethiopia has very limited road infrastructure (21 km of roads per 1000 km2) compared with other African countries. Transport cost is very high in Ethiopia due to the poor road infrastructure. This pushes the consumer prices up to inaccessible levels for most of the vulnerable groups and also penalizes producers. High transfer costs which are mainly due to high transport cost are barriers to import by increasing the IPP level (Resal-Ethiopia 1999).

The availability of transport network and commercial vehicles is an important element for the speedy movement of agricultural produce. Thus, improving the transport infrastructure is an inevitable necessity for improving agricultural marketing in Ethiopia. The government is currently implementing a road sector investment plan, of which the road maintenance program is an important component. According to the program, the Ethiopian government in cooperation with donors is committed to ensure the maintenance of inter-regional road networks.

In the surveyed markets, almost all-agricultural products were transported on road. The rural markets are connected with the central market by poorly paved roads. Many of the roads to the villages and rural markets are not motorable during the rainy season. Human portages and pack animals are the main means of transport for agricultural products by farmers and traders. Hired small and large trucks are most frequently used to collect larger loads. In towns, a variety of forms of transport are hired to get bags of agricultural produce from wholesale to retail points, including donkeys and lorries.

Table 3--Accessibility of roads

Region	Number of months out of year in which the roads are impassable	Number of months out of year in which road is passable only for 4-wheel vehicles	Percent of the Woreda that is cut of during the impassable period
Tigray	5.4	6.0	22.0
Amhara	4.6	3.3	27.9
Oromia	3.2	2.3	28.8
Total	4.3	3.5	26.4

Source: Market-level survey. IFPRI/ILRI. 2002

Table 4 reveals that there is a significant improvement in rehabilitating old roads and building new ones. About 71 percent of the respondents in Tigray indicated that new roads have been built since 1991. However it was only 28.6 percent of the respondents in Oromia who reported that there has been construction of new roads in their woredas while 78.6 percent indicated significant improvement in rehabilitating old roads. More than 63 percent of the respondents in Amhara region reported that they have observed improvement in the rehabilitation of old roads and construction of new roads since 1991. More than 78 percent of the respondents reported that the number of transporters have increased in Tigray (Table 4). This is also true in Amhara region where more than 66 percent of the respondents revealed that the number of transporters has increased after the reform (1991). Although about 92 percent of the respondents in Oromia reported that the number of transporters increased between 1991 and 1996, about 64 percent revealed that they have observed decline or no change since 1996. Table 5 indicates that the number of transporters and vehicles increased after the reform. More than 67 percent of the respondents in the grain market-level survey reported that there were increases in number of vehicles after the reform, suggesting that the improvement in rehabilitation and building new roads has resulted in the increase in the number of transporters after the market reform of 1991.

Table 4--Improvement of road network in the Woreda after the reform 1991

Region	Respondents who report that new roads were built (Percent)	Respondents who report that old roads were rehabilitated (Percent)
Tigray	71.4	78.6
Amhara	66.7	63.3
Oromia	28.6	78.6

Source: Market-level survey. IFPRI/ILRI. 2002

Table 5--Change in the number of transporters

Region	Changes in the No. of transporters		Changes in the No. of vehicles	
	Between 1991 & 1996 (%)	After 1996 (%)	Between 1991 & 1996 (%)	After 1996 (%)
Tigray				
Increased a lot	21.4	21.4	21.4	50.0
Increased slightly	57.1	57.1	50.0	35.7
Decreased a lot	7.1	-	7.1	-
Decreased slightly	-	7.1	-	-
No change	14.3	14.3	21.4	14.3
Amhara				
Increased a lot	58.3	41.7	66.7	25.0
Increased slightly	33.3	25.0	16.7	41.7
Decreased a lot	-	8.3	-	-
Decreased slightly	-	8.3	-	16.7
No change	8.3	16.7	16.7	16.7
Oromia				
Increased a lot	57.1	28.6	57.1	42.9
Increased slightly	7.1	7.1	35.7	35.7
Decreased a lot	21.4	21.4	-	7.1
Decreased slightly	-	28.6	-	7.1
No change	14.3	14.3	7.1	7.1

Source: Market-level survey. IFPRI/ILRI. 2002

STORAGE FACILITIES

The storage capacity of traders and availability of storage facilities in the market has been inadequate in Ethiopia. The storage capacity of traders, millers and state farms at national level is estimated at 2 million MT and the existing storage capacity is mostly owned by state enterprises (Resal-Ethiopia 1999). About 32.4 percent of the storage capacity in Ethiopia is the property of

the Ethiopian Trading Grain Enterprise (EGTE). The limited storage capacity of traders limits their purchasing capacity and reduces performance of the agricultural marketing system. Moreover, the storage facilities of farmers and grain traders also directly influence household food security.

The seasonality and fluctuations in the supply of agricultural produce and the regular demand of the produce on the other side necessitate storage. Storage of agricultural produce helps to speed up the supplies of agricultural produce throughout the year and avoid or reduce gluts in market and significant price decline during the peak period. Many of the farmers in Ethiopia sell the bulk of their produce right after harvest to pay taxes, pay loans and meet their cash requirement for social services. After harvest, farmers usually sell piece by piece, in small quantities, depending mainly on the cash requirements of families. It is during the harvest time that traders purchase grain and store it in the same market or transport it to the regional or terminal markets where it is usually stored for longer period of time and sell it in the lean period to earn profit. As indicated earlier, since farmers cannot hold stocks for longer periods, there is seasonal variation in the supply of grain and its prices. The details will be studied in the temporal arbitrage section of this study.

According to the market level survey, all the grain traders in Oromia reported that they used permanent storage facilities in the market towns. About 92 percent of the traders in Tigray and 83 percent of the traders in Amhara regions also revealed that they have permanent storage facilities in the market. About 93 percent of the respondents in Oromia reported that there have been increases in the number of warehouses for grain after the 1991 market reform. About 63 percent of the respondents in Tigray and about 56 percent in Amhara also indicated an increase in the number of warehouses after the reform. Moreover, some of the brokers would rent storage

space for regional traders until they dispose of grains. In some cases when the regional traders fail to sell their grain in a market day, they rent storage space from established retailers or wholesalers or others at higher storage cost.

FINANCE

One of the major impediments in the food grain trade is access to capital. Actually the wholesalers identified access to finance as one of the major constraints in the grain trade. They indicated that the requirement of high property collateral by commercial banks is the major constraint to access financial resources. Grain traders revealed that they need to be given preferential treatment or the development of a special loan product for them.

Access to capital is very important to expand trade activities. The new private grain traders have experienced difficulties in raising enough capital to run their business (Amha 2002). The main problems of accessing financial resources from the formal banks in Ethiopia include: high collateral requirement, complex procedures, and limited information on accessing finance from various sources. Table 6 shows that 58.3 percent of the respondents in Oromia markets towns reported that the financial institutions did not provide financial services to grain traders. About 35.7 percent of the respondents in Tigray and 25 percent in Amhara indicated that the financial institutions in the market towns or near to the market towns failed to deliver financial services to grain traders.

Table 6--Do the financial institutions provide loans to grain traders?

Region	No	Yes
Tigray	35.7	64.3
Amhara	25.0	75.0
Oromia	58.3	41.7

Source: Market-level survey. IFPRI/ILRI 2002

Most of the respondents (Tigray (50 percent), Amhara (58.3 percent) and Oromia (66.7 percent)) revealed that the number of financial institutions in the market towns have not increased since 1991. However, there have been increases in the number of financial institutions in some market towns. Although more than 63 percent of the respondents revealed some changes in accessing credit since 1991, between 36 and 25 percent of the respondents reported that the requirements to obtain credit from the formal financial institutions has not changed since 1991. Out of the respondents who reported that there is a change in accessing finance from the formal financial institutions, about 60 percent in Tigray and about 63 percent in Amhara reported positive improvement in obtaining credit. However, about 71 percent of the respondents in Oromia revealed that it has become even more difficult to obtain credit after the reform.

Table 7--What are the changes in accessing credit (%)

Region	Easier	More difficult to obtain credit
Tigray	60.0	40.0
Amhara	62.5	37.5
Oromia	28.6	71.4

Source: Market-level survey. IFPRI/ILRI. 2002

PERCEPTIONS OF MARKETING PROBLEMS

The grain traders' survey of IFPRI/ILRI (2002) indicated that the lack of a uniform mechanism to enforce licensing requirements on all traders (20.5 percent) as the most important problem in the grain markets in Ethiopia. About 20 percent of the grain traders reported the instability of grain prices as a main problem in grain marketing. Close to 25 percent of the respondents revealed that the non-transparent tax system and the multiple taxes as the major constraint in grain trade in Ethiopia. The low grain prices (8.5 percent), limited demand for grain (4.9 percent) and limited access to finance (4.7) were identified by small numbers of traders as the most important problems facing the grain marketing system.

Grain traders in the survey reported the instability of grain prices (23.1 percent), non-transparent tax system (15.7 percent), limited implementation of the licensing requirement (14.3 percent), weak demand (10.4 percent), multiple taxes (7.8 percent) and absence of government support to improve marketing as the second most important problems facing grain marketing in Ethiopia. They also indicated lack of uniform mechanisms to enforce licensing on all traders (17.4 percent), instability of grain prices (14.9 percent), weak demand (14.7 percent), non-transparent taxation system (12.2 percent), absence of government support to improve marketing (10.4 percent), limited access to finance (5.6 percent), multiple taxes (4.6 percent), and low grain prices (3.5 percent) as the third most important problems facing grain markets.

Table 9--Ranking of most important problem facing grain markets

Constraints	First problem		Second problem		Third problem	
	No. of responses	%	No. of responses	%	No. of responses	%
Prices are low	43	8.5	24	4.8	17	3.5
Prices are high	1	.2	1	.2	1	.2
Prices are unstable	102	20.1	116	23.1	72	14.9
Poor quality of goods			4	.8	7	1.5
Absence of grades or standards			1	.2	2	.4
Multiple taxes (b/n regions, Woredas, and zones)	46	9.1	39	7.8	22	4.6
Non-transparent taxation system	78	15.4	79	15.7	59	12.2
Difficulties in obtaining license					1	.2
Not all traders are licensed	104	20.5	72	14.3	84	17.4
Weak access to market information	2	.4	6	1.2	14	2.9
Limited access to credit	24	4.7	18	3.6	27	5.6
Weak legal system for contract enforcement	2	.4	3	.6	4	.8
Inadequate market infrastructure	1	.2	5	1.0	5	1.0
Absence of government support to improve marketing	11	2.2	26	5.2	50	10.4
Weak demand for agricultural products	25	4.9	52	10.4	71	14.7
Others	69	13.6	56	11.2	46	9.5
Total	508	100.0	502	100.0	482	100.0

Source: Survey of grain and coffee traders. IFPRI/ILRI. 2002

From the analysis of number, type of market participants, access to marketing facilities, barriers to entry, and government regulation, it can be inferred that the grain markets in Ethiopia are becoming reasonably competitive at retail level, particularly after the reform. However, there are many of problems which have affected the performance of the grain markets in Ethiopia. The major problems facing grain traders according to the market level survey are presented in Table 10.

Table 10--The most important problem facing grain traders (%)

Problem	Tigray	Amhara	Oromia
Prices are low	-	9.1	41.7
Prices are unstable	7.1	36.4	16.7
Multiple taxes	7.1	9.1	8.3
Non-transparent tax system	14.3	-	-
Unlicensed traders	7.1	9.1	-
Inadequate market structure	7.1	-	-
Absence of govt. support to improve marketing	7.1	9.1	-
Weak demand	14.3	18.2	33.3
Others	35.7	9.1	-

Source: Market-level survey of IFPRI/ILRI. 2002

The grain marketing problems differ from market to market and from region to region. For example in market towns of Oromia, low prices (41.7 percent), weak demand (33.3 percent), and unstable price (16.7 percent) are the major problems of grain trade. The respondents in Amhara identified the instability of prices (36.4 percent) and weak demand (18.2 percent) as the main problem of grain trade. In Tigray, the non-transparent tax system and weak demand for grain are the major problems in grain trade. Some of the respondents in Oromia, Amhara and Tigray identified multiple taxes, unlicensed trade, and absence of government support as the main problems of grain trade.

DISCUSSION

Comments/Questions:

- Issue of licensing needs to be addressed.
- The paper did not consider the standards and grades of grain quality criteria by the national office.

- Data source used is only from CSA. Why not use FAO data?
- What is the role of cooperatives in grain marketing? They need a conducive environment and appropriate institutions. In some cases it is a question of ethics not of rules and regulations.
- What is the definition of 'trader'? Many traders are farmers.
- Consider disaggregating traders according to their size and types of grains they sell.
- There are few or no commercial traders in import and export sectors.
- The paper needs a thorough empirical analysis especially in identifying intermediaries and the negative impacts on storage.

Responses by Dr. Wolday:

- Licensing is not a major issue in the country.
- The definition of the term 'trader' is not that important in the study since in some cases residential houses are also used as storage facilities mainly for tax purposes. All traders do whole selling and retailing and it is difficult to differentiate.
- Disaggregating traders according to the types of grain they sell is hardly possible since a trader usually sells more than one type of grain in the market.
- Standards and grades for grain may be there but since they are not being practically implemented, we consider them as if they do not exist.

CHARACTERIZING GRAIN TRADERS[3]

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FIRM PROFILE

We start by providing a profile of the trading firm, that is: the gender distribution, the ownership structure, the extent of specialization, and related variables. We will present this evidence broken down by region as well as by working capital levels (terciles). Traders are mostly male, with some 5 percent of female traders across the sample. There is little variation in this proportion either between regions or by firm size.

In terms of specialization, wholesale traders generally do not engage in brokerage or agency, with the exception of Addis Ababa, where one third of the traders indicated that they were also agents or brokers. This is to be expected given the large population of brokers in Addis Ababa that serve as intermediaries for the regional buyers and sellers. Traders appear to be relatively specialized in grain trading, with only 20 percent indicating that they had another occupation, with a significant share only in Oromia/Dire Dawa. It would appear that the larger traders are less specialized, with a higher share of traders with other occupations. At the same time, it would appear that trade is the dominant activity in terms of revenue, with about 90 percent of trade revenue out of all revenue and 82 percent of grain trade revenue out of total trading revenue. This implies that for the sample as a whole, grain trade revenue is about three-quarters of total income.

[3] Based on the background paper, "Getting markets right in Ethiopia: institutional changes to grain markets", by Eleni Gabre-Madhin and Wolday Amha, IFPRI 2003 (mimeo).

Looking at the structure of ownership, grain trading firms are most likely solely owned enterprises, rather than a subsidiary of a large foreign or domestic corporation or a partnership. Thus, the share of sole ownership is about 90 percent across regions and terciles. Across the sample, the share of inherited businesses is very high, 87 percent on average, and 100 percent in Amhara and Tigray. This suggests that, despite the lowering of entry barriers by reform policy, the importance of social capital may still dominate the actual entry conditions into trading. We will explore this further in later sections.

Table 1--Firm profile for grain trader by region

		Tigray	Amhara	Oromia+ Dire dawa	Addis Ababa	Total
% female		4.84	3.68	8.82	3.13	5.25
% trader + broker or agent		1.61	2.11	2.22	34.38	6.03
% other occupation		16.94	14.74	33.09	10.94	19.65
% trading revenue/total revenue	means	92.77	93.16	85.74	85.94	90.2
	std dev	17.07	18.64	26.2	26.14	21.79
% grain trade revenue/total trade revenue	means	90.69	78.87	82.49	80.88	82.93
	std dev	18.44	22.29	23.06	24.02	22.29
% sole owner		95.97	90.00	91.18	87.50	91.44
years of business	means	7.54	8.33	8.04	12.58	8.59
	std dev	9.08	9.15	8.52	11.28	9.37
% inherited		100.00	100.00	72.73	85.71	87.1
N		124	190	136	64	514

Source: IFPRI/ILRI survey 2002.

Table 2--Firm profile for grain trader by working capital Tercile

		Tercile1	Tercile2	Tercile3	Total
% female		5.91	4.08	5.59	5.25
% trader + broker or agent		7.53	7.48	3.72	6.03
% other occupation		16.67	18.37	26.09	19.65
% trading revenue/total revenue	*means*	92.04	91.42	92.04	90.2
	s.d.	20.37	19.37	202.37	21.79
% grain trade revenue/total trade revenue	*means*	82.8	87.05	82.8	82.93
	s.d.	24.55	17.3	24.55	22.29
% sole owner		90.86	91.84	91.30	91.44
years of business	*means*	7.17	8.03	10.96	8.59
	s.d.	9.59	8.06	9.60	9.37
% inherited		90.91	60.00	100.00	87.1
N		186	147	161	494

Source: IFPRI/ILRI survey 2002.

TRADER DEMOGRAPHICS

We now present an overview of trader demographics (Table 3). Traders are on average, males in their mid-thirties, with little variation across region or across size. In Amhara and Tigray, the ethnic composition of traders is highly concentrated in a single group, while there is more even representation of different ethnic groups in Oromia and Addis Ababa. This would certainly be expected in Addis Ababa or Dire Dawa, which are both more mixed population than the regions.

Education levels are surprisingly constant between and within regions, with six years of education on average. In terms of the social capital or skills that they bring into the firm from a previous occupation, the major activity prior to entering into trade is being a student, which implies that traders were probably helpers in the family business before becoming official managers of the business. Also, to measure the social capital from parents' occupation, traders were asked about their parents' occupation. Fathers tend to have worked in agriculture as well as trade, while mothers were generally homemakers. In the case of Addis Ababa, where there is a

longer tradition of trade, the share of traders whose fathers were farmers is quite low at 45 percent. Another important indication of social capital is the extent of family members that work together in the same business or work in another business. It appears that this type of social capital is more prevalent in Oromia/Dire Dawa than in Tigray and Amhara. These findings, both in terms of firm profile and trader demographics, suggest that trade is not new to the immediate post-reform era, but rests on a long tradition in which the business passes from father to son. It appears that firms operate in a traditional manner, with limited schooling of sons before they take over the business.

Table 3--Trader demographics for grain traders by region

		Tigray	Amhara	Oromia+ Dire dawa	Addis Ababa	Total
Age	*means*	38.00	37.39	36.90	37.77	37.46
	s.d.	13.34	14.20	12.50	15.08	13.65
Ethnic group						
Amhara	%	-	98.95	33.82	31.25	49.42
Oromo	%	2.42	0.53	38.97	35.94	15.56
Tigrai	%	97.58	0.53	2.21	4.69	24.90
Gurage	%	-	-	9.56	20.31	5.06
Others	%	-	-	15.44	7.81	5.06
Years education	*means*	6.09	7.04	5.24	7.09	6.34
	s.d.	3.50	4.16	4.73	5.08	4.35
Total years in trade (this business and other previous business)	*means*	3.15	3.26	3.24	2.80	3.17
	s.d.	6.27	5.01	5.81	5.36	5.58
Previous occupation						
Farming/Fishing/Livestock raising	%	23.39	18.42	13.24	7.81	16.93
Processing of agricultural products	%	0.81	1.05	-	-	0.58
Trade in other agricultural products	%	1.61	7.89	8.09	-	5.45
Trade in non-agricultural commodities	%	15.32	6.84	14.71	-	10.7
Transport (e.g. truck, taxi)	%		0.53	1.47	4.69	0.78

Table 3--Trader demographics for grain traders by region (continued)

		Tigray	Amhara	Oromia+ Dire dawa	Addis Ababa	Total
Crafts (tailor, woodwork, brick)	%	1.61	4.74	0.74	1.56	2.33
Services (ex: blacksmith, mechanic, res	%		3.16	0.74	1.56	1.56
Wage worker/civil servant	%	11.29	7.89	13.97	17.19	11.48
Student	%	21.77	39.47	30.88	48.44	34.05
No work/house work	%	3.23	1.58	0.74	4.69	2.14
Soldier	%	8.06	4.74	2.94	1.56	4.67
Others	%	12.9	3.68	12.5	12.5	9.34
Father occupation						
Farming/Fishing/Livestock raising	%	78.23	55.79	58.82	45.31	60.7
Processing of agricultural products	%	0.81	2.63	0.74		1.36
Trade in other agricultural products	%	0.81	4.74	5.15	1.56	3.5
Trade in non-agricultural commodities	%		3.68	7.35	3.13	3.7
Transport (e.g. truck, taxi)	%	-	-	-	-	-
Crafts (tailor, woodwork, brick)	%	-	1.05	2.21	-	0.97
Services (ex: blacksmith, mechanic, res	%	-	0.53	0.74	-	0.39
Wage worker/civil servant	%	4.03	2.63	2.21	6.25	3.31
Student	%	-	0.53	-	-	0.19
No work/house work	%	0.81	0.53	0.74	-	0.58
Soldier	%	-	-	2.21	-	0.58
Others	%	15.32	27.89	19.85	43.75	24.71
Mother occupation						
Farming/Fishing/Livestock raising	%	-	1.58	7.35	3.13	2.92
Processing of agricultural products	%	-	-	-	-	-
Trade in other agricultural products	%	-	0.53	2.21		0.78
Trade in non-agricultural commodities	%	0.81	0.53	4.41	4.69	2.14
Transport (e.g. truck, taxi)	%	-	-	-	-	-
Crafts (tailor, woodwork, brick)	%	-	-	0.74	-	0.19
Wage worker/civil servant	%	-	1.05	-	-	0.39
Student	%	-	-	-	-	-
No work/house work	%	94.35	94.74	77.21	89.06	89.3
Soldier	%	-	-	-	-	-
Others	%	4.84	1.58	7.35	3.13	4.09
Father years in trade	*means*	3.37	9.49	8.69	12.42	8.17
	s.d.	9.23	14.38	14.58	14.24	13.64
Mother years in trade	*means*	0.37	0.84	2.32	1.56	1.21
	s.d.	3.00	4.43	7.59	5.37	5.35
Total family size	*means*	7.52	7.02	7.34	8.39	7.40
	s.d.	3.38	3.11	4.17	4.26	3.65
Total family members in own business	*means*	0.53	0.64	0.72	0.81	0.66
	s.d.	0.69	0.90	1.09	0.92	0.92

Table 3--Trader demographics for grain traders by region (continued)

		Tigray	Amhara	Oromia+ Dire dawa	Addis Ababa	Total
Total family members in other business	*means*	0.40	0.51	0.74	0.75	
	s.d.	0.77	0.95	1.31	1.45	
N		124	190	136	64	514

Source: IFPRI/ILRI survey 2002.

SOCIAL CAPITAL AND TRADING NETWORKS

One way to view social capital is as the number of trading contact, whom traders identify as traders whom they "know well, speak with regularly, and consult with on market-related matters." Given that knowing someone well is a highly subjective concept, much discussion and training was given on distinguishing between casual acquaintances and people whom one knows well. The data show that traders have increased their stock of social capital, from when they first started to the present, so that years in business actually have implications for social capital levels (Table 4). Second, across regions, it appears that traders in Addis Ababa, due to their central location, are better endowed in social connections than regional traders. Viewed across terciles, larger traders also have significantly higher levels of social capital, consistent with earlier empirical work in Madagascar (Fafchamps and Minten 1999).

Another dimension of social capital is membership in associations. The data reveal that associative life in general in Ethiopia is weak with the exception of Addis Ababa traders, who have strong membership in trader organizations. Overall, only one third of the sample is engaged in a formal association of traders and much less in the case of informal groups. It is encouraging that participation in the Chamber of Commerce is relatively strong, up to 100 percent in Amhara. Viewed by tercile, again it would appear that social capital has positive relations with size in that the extent of associative life increases significantly with working capital size.

The third dimension by which we view social capital is the extent to which traders operate within networks of "regular partners" or *dembegna.* Repeated trade with a few regulars is akin to the concept of trading coalitions that Greif (1999) has analyzed in medieval Europe, or modern business networks in Asia and elsewhere. Indeed, the majority of Ethiopian traders do work with regular suppliers and regular customers (64 and 73 percent respectively) and the use and number of regular partners increases with firm size. Also, it appears that traders in the central market of Addis Ababa use less regulars, since they have greater social capital in terms of contacts. These interesting results confirm that social capital is an asset to traders (Table 4).

Table 4. Social capital and networks for Grain Trader by Working Capital Tercile

		Tercile1	Tercile2	Tercile3	Total
Total contacts in purchase market now	*means*	20.76	27.2	30.45	24.58
	s.d.	29.27	31.24	25.73	28.33
Total contacts in purchase market when started	*means*	9.61	10.69	11.4	11.99
	s.d.	13.5	14.89	21.6	37.97
Total contacts in sales market now	*means*	19.85	25.8	27.5	23.73
	s.d.	27.64	31.11	24.79	27.9
Total contacts in sales market when started	*means*	9.18	9.46	13.65	9.95
	s.d.	12.89	14.62	23.24	13.97
% member of chamber commerce		50	45	71.43	56.92
% member of formal association		42.86	55	21.43	38.46
% member of informal association		7.14	0	3.57	3.08
Work with regular supplies	% traders	59.14	62.59	70.19	64.2
Work with regular customers	% traders	65.59	74.83	79.5	73.54
Total number of regulars -- purchase	*means*	9.49	8.18	14.45	10.61
	s.d.	73.42	21.97	38.81	50.79
Total number of regulars -- sale	*means*	8.18	11.08	16.35	11.59
	s.d.	13.93	16.58	24.65	18.77
Total number of regulars in main market	*means*	16.39	16.19	24.57	18.77
	s.d.	74.40	24.99	33.10	50.38
Total number of regulars in distance market	*means*	1.28	3.07	6.22	3.43
	s.d.	3.84	11.52	33.22	19.93
Total number of regulars	*means*	17.67	19.27	30.80	22.20
	s.d.	74.61	30.34	50.16	55.77
% purchase with regulars	*means*	57.55	60.88	64.4	61.24
	s.d.	35.41	34.94	29.24	33.2
% sales with regulars	*means*	39.69	42.08	49.09	43.72
	s.d.	31.11	29.71	33.36	31.89
% regulars - same ethnic	*means*	70.53	67.57	65.54	67.12
	s.d.	35.93	36.32	34.70	36.15
% regulars - same religion	*means*	58.70	64.65	64.29	61.97
	s.d.	37.50	33.26	32.11	34.63
% relatives/total regulars	*means*	7.97	7.76	8.15	7.94
	s.d.	20.86	16.42	13.06	17.43
% exclusive/total regulars	*means*	25.09	23.32	28.01	24.95
	s.d.	38.07	37.43	39.62	37.93
% belong to an ekub group		24.19	26.53	39.75	29.18
N		**186**	**147**	**161**	**494**

Source: IFPRI/ILRI survey 2002.

BUSINESS ASSETS AND CAPACITY

We now turn to the fundamental issue of firm assets, which are important to understanding the underlying constraints of the private sector. Data on physical, human, and financial assets are presented in Table 5. The evidence presented suggests that trading firms are essentially micro-enterprises operating with a weak asset base.

A closer look at their business assets reveals that, while the majority own a weighing scale (74 percent), less than 10 percent own either a transport animal, a non-motorized vehicle, or a motorized vehicle, less than 20 percent own the shop out of which they operate, and only one-third own a telephone. Traders' storage capacity is also relatively weak, with a maximum average capacity of 600 quintals or 60 tons. The total value of traders' assets is Birr 23,000 ($2,700), which is very small.

The weak asset base of trading firms is confirmed by their limited access to finance. In terms of their financial capacity, only one-half of trading firms have a bank account and only 11 percent of traders received a bank loan in 2002. Of their total credit, only one-third is supplied by the formal banking system, while the rest is mainly supplied by informal sources such as other traders and friends and family. Generally, working capital levels are very small, on average Birr 27,600 ($3,200), and total annual credit is on average Birr 13,500 ($1,600). Thus, trading firms operate with very limited assets, limited human and physical capital, and a weak financial base. In interviews, they affirm that their greatest constraint is access to finance, which they view as a constraining factor in expanding their scale of operations, achieving greater efficiency, and engaging in the long-term storage needed to alleviate the year to year volatility in prices.

Table 5--Business assets and capacity for Grain Trader by Region

		Tigray	Amhara	Oromia+ Dire dawa	Addis Ababa	Total
a) Physical						
% exclusive storage facilities		98.39	97.89	99.26	100	98.64
Maximum storage capacity (quintal)	*means*	436.86	538.14	897.1	538.5	609.39
	s.d.	894.73	1,705.85	1,995.5	1,098.6	1,578.58
% own storage		28.69	24.73	45.19	1.56	28.21
% store in residence		5.65	8.95	12.5	3.13	8.37
Maximum storage in residence	*means*	465.00	274.0	875.3	5,000	759.95
	s.d.	424.69	713.9	2,445.1	0	1,845.93
% own home						
% own scales		60.48	71.05	88.97	78.13	74.12
% own transport animals		2.42	7.89	13.97	1.56	7.39
% own non-motorized transport equipment		8.06	3.68	1.47	0	3.7
% own vehicle		4.03	4.74	16.91	10.94	8.56
% own shop facility		25	13.68	30.15	1.56	19.26
% telephone		24.19	30	37.5	70.31	35.6
% mobile phone		0	0.53	0.74	35.94	4.86
Total current value of assets	*means*	22,350	12,835	46,326	5,225	23,044
	s.d.	98,160	40,772	124,006	16,311	84,995
b) Human						
Owner months	*means*	12.52	12.88	12.82	14.53	12.98
	s.d.	3.77	3.70	7.15	6.61	5.26
Family employees months	*means*	14.30	15.43	14.92	21.08	15.78
	s.d.	8.16	11.03	11.65	17.91	11.89
Non-family permanent	*means*	16.00	31.46	30.26	39.94	32.28
	s.d.	6.93	22.62	25.98	34.47	27.36
Non-family temporary	*means*	74.8	42.61	43.41	41.77	49.86
	s.d.	78.48	66.19	51.91	27.64	62.81
Number authorized to sell	*means*	0.73	0.65	0.97	1.06	0.81
	s.d.	0.76	0.69	1.15	1.17	0.92
Number authorized to buy	*means*	0.60	0.66	0.75	1.08	0.72
	s.d.	0.86	0.98	0.82	1.23	0.96

Table 5--Business assets and capacity for Grain Trader by Region

		Tigray	Amhara	Oromia+ Dire dawa	Addis Ababa	Total
Days of operation per year	*means*	328.35	290.11	294.03	311.19	303.00
	s.d.	66.10	80.80	64.66	17.31	69.55
Days absent per year	*means*	65.89	58.01	50.97	36.33	55.30
	s.d.	49.63	35.34	44.83	33.04	42.06
% days absent for social reason/days absent	*means*	81.05	86.63	69.17	98.68	82.40
	s.d.					
% firms where business operates in absence		62.90	57.37	63.97	75	62.65
In absence, manager of business						
a relative who works in the enterprise	%	38.46	32.11	54.02	50	42.24
a relative who does not normally works in the enterprise	%	3.85	6.42	2.3	2.08	4.04
a permanent worker of the enterprise	%	14.10	12.84	5.75	8.33	10.56
a friend	%	1.28	0.92	2.3	0	1.24
another person	%	42.31	47.71	35.63	39.58	41.93
c) Financial						
Current working capital	*means*	32,835	19,612	41,200	12,465	27,627
	s.d.	61,054	48,145	88,903	18,627	63,062
Last year working capital	*means*	24,406	22,898	38,340	13,229	26,145
	s.d.	40,400	70,623	87,841	28,534	66,515
Starting working capital	*means*	12,022	7,277	12,872	5,745	9,713
	s.d.	42,056	13,508	24,533	9,134	25,870
Total loan amount	*means*	16,751	10,134	21,784	3,555	13,993
	s.d.	45,092	91,549	61,294	16,730	68,084
% bank	*means*	37.88	27.70	37.242	18.18	33.050

Table 5--Business assets and capacity for Grain Trader by Region

		Tigray	Amhara	Oromia+ Dire dawa	Addis Ababa	Total
	s.d.	47.48	45.08	47.158	40.45	46.171
% microfinance	*means*	14.423	22.22	0	0	11.818
	s.d.	34.777	41.96	0	0	32.144
% credit association	*means*	1.923	0.00	0.09	0	0.633
	s.d.	13.868	0.00	0.65	0	7.791
% NGO	*means*	1.923	1.85	0	0	1.212
	s.d.	13.868	13.61	0	0	10.976
% other trader	*means*	3.846	12.96	11.81	18.18	10.101
	s.d.	19.418	33.90	31.17	40.45	29.788
% money lender	*means*	1.202	0.00	4.17	0.00	1.591
	s.d.	8.667	0.00	20.19	0.00	11.968
% friends/family	*means*	38.799	35.27	46.69	63.64	41.595
	s.d.	47.675	48.15	48.98	50.45	48.523
Persons willing to give additional loan	*means*	3.067	2.67	3.26	2.73	2.929
	s.d.	3.808	3.51	3.34	3.51	3.539
Maximum funds could borrow	*means*	14,846	10,495	17,246	9,661	13,422
	s.d.	28,310	29,592	31,865	11,392	28,427
% firms with bank account		52.42	40.53	55.15	59.38	49.61
N		**124**	**190**	**136**	**64**	**514**

Source: IFPRI/ILRI survey 2002.

BUSINESS PRACTICES AND TRANSACTION COSTS

Having some sense of the characteristics and basic profile of the private Ethiopian grain trade sector, we now address the business practices of firms and the transaction costs they face. Here, we consider transaction costs in the New Institutional Economics definition of transaction costs as the cost of coordination in the market: search for partners, for information, of negotiating and enforcing contracts, etc.

Use of Intermediaries

In terms of search behavior, the majority of traders use intermediaries, such as brokers and agents, with the exception of Addis Ababa, where 75 percent of traders do not use

intermediaries (Table 6). Moreover, the basis of the relationship between traders and brokers/agents does not appear to be social relations. In Amhara and Tigray, they appear to share a common ethnic and religious identity. What is striking is that, in all cases, the relations appear to be exclusive, meaning that traders do not work with more than one broker/agent at the same time.

Table 6--Use of intermediation by grain trader by region

		Tigray	Amhara	Oromia+ Dire dawa	Addis Ababa	Total
% with no intermediation		25.81	40.53	36.76	75	40.27
Total number of intermediaries	*means*	3.73	7.56	4.92	5.34	5.66
	s.d.	7.94	21.81	13.50	21.00	17.17
% same ethnic	*means*	85.28	82.51	41.45	38.33	69.53
	s.d.	29.39	33.85	41.44	43.97	40.71
% same religion	*means*	94.66	72.08	54.88	57.19	73.25
	s.d.	5.54	36.63	40.81	38.59	36.68
% socially connected	*means*	29.70	33.03	30.60	28.31	31.10
	s.d.	42.83	44.73	42.63	44.48	43.38
% exclusive relations	*means*	100	100	100	100	100
	s.d.	0	0	0	0	0
Number of years together	*means*	2.69	2.31	3.43	0.99	2.53
	s.d.	3.07	3.10	5.20	2.43	3.76

Source: IFPRI/ILRI survey 2002

A closer look at the use of intermediaries reveals a consistent picture with 1996 survey results by Gabre-Madhin (2001) in that traders use intermediaries for distant market purchases and sales when they are engaged in significant transactions in these markets and have less social capital.

Payment Terms and Supplier Credit

We now delve further into the contractual relations and parameters between market actors. Generally, throughout the country, payment terms are overwhelmingly on a cash basis,

and wire transfers or checks are not used. While this suggests a lack of development in the financial sector, it also has implications for the degree of trust between actors.

Second, there is good evidence that supplier credit is relatively common, with around half of the sample indicating that they regularly bought on credit and 75 percent that they sold on credit. There is emerging evidence that the credit is obtained at a price premium.

Forward Contracts (Advance Payments). Moreover, it appears that there are some limited advance payment practices with farmers, some 3.5 percent of the sample. On the other hand, this practice seems relatively more common between traders, with 23 percent of the sample engaged in this. Advance payments are somewhat similar to forward contracts in that, in the majority of cases, the price is set at the time the advance is given. In the case of farmers, data was not available but for traders, the advance represents about 30 percent of the contract value (Table 8).

Table 7--Use of intermediaries by region, market location and transaction

	Tigray		Amhara		Oromia		Addis Ababa		Dire dawa		Total	
	Mean	s.d.	Mean	s.d.	Mean	s.d.	Mean	s.d.	Mean	s.d.	Mean	s.d.
% local purch - Buying agent	2	13	2	13	0	0	0	0	0	0	1	10
% local purchases - Broker	46	43	24	37	23	38	7	23	31	37	27	39
% local purchases - On your own	52	43	74	39	77	38	93	23	69	37	72	40
% distant purchases - Buying agent	5	21	27	44	5	20	25	46	33	58	15	35
% distant purchases - Broker	62	46	43	48	27	42	0	0	33	58	41	47
% distant purchases - On your own	33	44	31	44	68	43	75	46	33	58	44	47
% local sales - Broker	3	16	7	22	12	28	2	6	1	3	7	21
% local sales - Selling agent	0	0	0	0	3	15	0	0	0	0	1	7
% local sales - On your own	97	16	93	22	85	31	98	6	99	3	93	22
% distant sales - Broker	78	44	38	48	53	48	0	0			51	48
% distant sales - Selling agent	11	33	29	47	18	36	0	0			19	39
% distant sales - On your own	11	33	33	46	29	40	100	0			30	43
N		124		190		121		64		15		514

Source: IFPRI/ILRI survey 2002

Table 8--Contractual relationship for grain trader by region

		Tigray	Amhara	Oromia+ Dire dawa	Addis Ababa	Total
Payment method:						
% purchase with cash	*means*	93.83	96.5	96.04	89.38	94.85
	s.d.	18.95	14.5	15.96	26.58	17.98
% sales with cash	*means*	98.39	97.97	92.27	90.89	95.68
	s.d.	71.7	11.15	22.01	19.30	15.52
% firms that obtain supplier credit		51.61	51.58	50.74	57.81	52.14
% firms 2with different price with supplier credit		17.74	26.04	14.71	19.44	20.23
Price premium for supplier credit (credit price/cash price)	*means*	1.03	1.02	1.03	1.03	1.03
	s.d.	0.04	0.09	0.02	0.01	0.06
% firms that give customer credit		77.42	75.26	74.26	71.87	75.10
% firms with different price with customer credit		8.42	18.12	13.13	17.78	14.32
Price premium for customer credit (credit price/cash price)	*means*	1.03	1.03	9.98	1.04	3.36
	s.d.	0.02	0.29	29.31	0.05	15.04
% firms that give advance payments to farmers		2.42	2.63	6.62	1.56	3.50
% firms that give advance payments to traders		26.61	20.53	23.53	21.87	22.96
Farmers:						
% total value that is paid in advance	*means*	6.25	1.11	9.58	0.00	5.30
	s.d.	8.76	3.33	15.28	0.00	10.74
Days until delivery	*means*	1,034	6.00	16.57	-	328
	s.d.	1,211	1.41	21.52	-	779
% *means* of price determination	*means*					
- the purchase price is set at the time the advance is given						78.57
- the purchase price is the market price at the time of delivery						7.14
- the purchase price is negotiated at delivery						14.29
- the purchase price is not entirely set but it must stay within a bracket agreed upon at the time the advance is given						
- other						
% firms that obtain different price with advance payment		0	0	0	0	0
Price premium for advance payment (advance price/cash price)	*means*	-	-	-	-	-
	s.d.	-	-	-	-	-

Table 8--Contractual relationship for grain trader by region (continued)

		Tigray	Amhara	Oromia+ Dire dawa	Addis Ababa	Total
Traders:						
% total value that is paid in advance	*means*	31.47	31.58	36.07	28.38	32.25
	s.d.	27.57	33.51	33.96	32.27	31.70
Days until delivery	*means*	43.21	5.18	11.70	4.20	16.44
	s.d.	203	6.50	16.14	7.49	103
% *means* of price determination						
- the purchase price is set at the time the advance is given						87.93
- the purchase price is the market price at the time of delivery						7.76
- the purchase price is negotiated at delivery						2.59
- the purchase price is not entirely set but it must stay within a bracket agreed upon at the time the advance is given						
- other						1.72
% firms that obtain different price with advance payment		3.33	2.63	6.45	0.00	3.48
Price premium for advance payment (advance price/cash price)	*means*	-	-	-	-	-
	s.d.	-	-	-	-	-
% purchases with supplier credit	*means*	17.06	15.98	19.23	28.94	18.71
	s.d.	21.56	21.69	27.99	34.68	25.60
% purchases with payment on delivery	*means*	77.81	80.17	78.10	65.20	77.19
	s.d.	25.46	24.17	29.73	37.45	28.23
% purchases with advance to farmers	*means*	0.52	0	0.15	0.47	0.23
	s.d.	3.30	0	1.05	2.78	1.97
% purchases with advance to traders	*means*	4.60	3.85	2.52	5.39	3.87
	s.d.	13.89	12.75	9.26	17.28	12.90
% sales with supplier credit	*means*	25.23	30.45	26.90	27.52	27.89
	s.d.	22.68	27.46	25.38	25.77	25.62
% sales with payment on delivery	*means*	74.51	69.52	72.77	71.55	71.83
	s.d.	22.75	27.47	25.42	25.82	25.65
% sales with advance to traders	*means*	0.26	0.04	0.33	0.94	0.28
	s.d.	2.01	0.39	1.94	4.53	2.15
N		124	190	136	64	514

Source: IFPRI/ILRI survey 2002

INFORMATION SEARCH

It would appear from IFPRI survey results that, on the ground, private operators have extremely limited, if not virtually no, access to market information. Thus, survey respondents

respond that they rely entirely on their own observations and interactions with other traders for information on local and distant market prices. Private operators benefit from public information dissemination via radio and television only for information on national supply and demand trends, policy changes, and external market prices. Second, traders note that they do not listen to the Radio Fana broadcasts because the prices are reported erroneously.

The data suggest that those with greater physical capital resources are also better endowed with market information, which is measured by the number of products and markets, which traders follow regularly. While our survey did not cover the information access of producers, it is clear that producers (smallholders) are severely constrained with regard to market information.

Table 9--Price, partner, and product information search behavior for grain trader by region

		Tigray	Amhara	Oromia+ Dire dawa	Addis Ababa	Total
Number of products	*means*	3.73	1.65	3.99	3.06	3.59
	s.d.	1.48	0.00	2.60	1.38	1.91
Total number of markets	*means*	2.86	2.64	3.11	2.69	2.82
	s.d.	1.23	1.35	1.96	1.86	1.58
Total number of people with whom consult	*means*	6.74	5.68	5.07	8.03	6.07
	s.d.	6.50	5.39	4.82	7.88	5.96
Main source of info on:						
% local market price						
- Personal observation		63.71	67.37	53.68	64.06	62.45
- Speaking with other traders like yourself		15.32	20.53	22.06	14.06	18.87
% other market price						
- Personal observation		27.42	23.16		18.75	21.98
- Speaking with other traders like yourself		33.06	23.16	30.15		26.65
- Speaking with intermediaries				30.15		15.95
- Speaking with suppliers					28.13	9.73
% local supply and demand						
- Personal observation		85.48	88.95	53.68	78.13	77.43
- Speaking with other traders like yourself			6.84	16.18	9.38	9.14
- Speaking with intermediaries		5.65				5.25
% regional supply and demand						
- Personal observation		27.42	7.37		12.5	14.01
- Speaking with other traders like yourself		16.13	11.05	21.32		14.79
- Speaking with intermediaries				15.44		7.59
- Radio/television					17.19	9.34
% national supply and demand						
- Personal observation					12.5	8.37
- Speaking with other traders like yourself		24.19	19.47	11.76		17.51
- Radio/television		31.45	32.11	42.65	43.75	36.19
% policies/regulations						
- Concerned government official		24.19	23.16	8.09	14.06	18.29
- Radio/television		54.03	50.53	73.53	78.13	60.89
% price in external markets						
- Speaking with other traders like yourself		5.65	8.95	6.62	6.25	7.20
- Radio/television		43.55	46.32	50	43.75	46.30
% can get precise information without visiting themselves		58.06	56.84	53.68	53.13	55.84
Number of telephone calls last year	*means*	71.23	68.00	154.59	387.22	131.44
	s.d.	128.89	141.73	517.52	721.86	395.64
Cost of telephone calls last year	*means*	252.52	254.79	300.53	333.45	276.14
	s.d.	383.37	479.54	536.47	362.55	461.21

Table 9--Price, partner, and product information search behavior for grain trader by region (continued)

		Tigray	Amhara	Oromia+ Dire dawa	Addis Ababa	Total
Total number of trips	*means*	11.35	11.58	14.12	0.00	10.76
	s.d.	39.46	55.32	27.35	0.00	41.42
Time to find a buyer (days)	*means*	41.26	25.79	53.30	8.45	34.64
	s.d.	132.06	69.28	144.59	22.82	108.32
Time to find a seller (days)	*means*	29.78	21.23	37.60	6.39	25.78
	s.d.	76.07	57.28	100.98	20.08	73.65
% Outcome if can't find a partner in distant market						
- You leave your products with a selling		2.5	8.93	57.45		20.37
- You return with the products on the following days		25	23.21	8.51	31.58	20.37
- You sell products at a reduced price		50	55.36	27.66	47.37	45.06
- You sell on credit		2.5	3.57	2.13	21.05	4.94
- You recondition the product to increase		20	3.57	-		6.17
- You return with the product to your own		-	1.79	-		0.62
- Other			3.57	4.26		2.47
% inspect product oneself to determine variety of products		98.25	98.92	99.2	100	98.97
% inspect product oneself to determine quality of products		98.25	99.46	99.22	100	99.18
N		124	190	136	64	514

Source: IFPRI/ILRI survey 2002

CONTRACT ENFORCEMENT

Empirical research of grain marketing in Ethiopia reveals that trading partners can, and do, cheat by delivering a lower quality of grain than was discussed at the time of sale. Since there are no official inspections of grain, a trader who contacts a partner by telephone is forced to take the partner's word at face value. Furthermore, grain quality can deteriorate in the course of storage or transport to the buyer. Traders can deceive partners by misquoting or omitting information on any of the above parameters at the time of the oral agreement of the grain price. Other opportunities for fraud are presented by the lack of standardized sacks. Traders indicate that sacks, re-used numerous times, vary dramatically in terms of the quantity they carry and their quality. Traders can gain from having sacks that hold less than the 100 kilograms that they

are presumed to hold (if the cheater is a seller). In small rural markets where there are no scales, traders are reported to cheat farmers routinely by buying grain in sacks that hold considerably more than 100 kilograms. Moreover, the practice of re-using sacks also creates room for opportunistic behavior. Traders report that buying a load of grain in the sacks of the selling merchant is undesirable because the seller will provide the oldest possible sacks, which are likely to tear and cause grain loss or damage over the course of transport.

Although the majority of grain traders (67 percent) indicate that they have trading disputes with partners, recourse to a legal third party is very limited, with only 4 percent of traders who engage in legal action (Gabre-Madhin 2001). In part, the lack of legal recourse is due to the time-consuming nature and inaccessibility of formal courts. Moreover, it is not customary for business partners to engage in legal suits (Berry 1993). A trader who has been deceived by a partner must return to the market in order to seek out the wrongdoer and engage in a public confrontation. When the partner is not found or a settlement cannot be reached, the trader bears the loss. This commitment problem severely inhibits traders from placing orders with other traders in distant markets or, in general, from trading with unknown merchants, even if they physically meet.

The implications of commitment failure in this context are thin markets in which traders operate within narrow relation-based networks, and limited market response to price signals, as a consequence. With increased complexity comes the scope for opportunistic behavior, contractual default, etc. In the Ethiopian context, recent IFPRI survey results suggest that the private sector currently operates in an enforcement vacuum. That is, as shown in Table 10, a large share of traders regularly experience contractual failure, both with suppliers and customers. The data indicate that virtually all disputes (94 percent) are resolved internally, rather than via

third party mechanisms including community and peer groups. This finding confirms the highly risky environment in which traders operate.

Table 10--Contract enforcement for grain trader by region

		Tigray	Amhara	Oromia+ Dire Dawa	Addis Ababa	Total
Dispute with suppliers						
-- bad quality	% traders	41.94	60.53	44.12	67.19	52.53
-- disagreement over measure	% traders	23.39	35.79	21.32	31.25	28.4
-- renegotiate price	% traders	40.32	49.47	30.88	51.56	42.61
-- stolen	% traders	1.61	4.21	3.68	3.13	3.31
Dispute with purchase orders						
--late delivery	% traders	42.11	65.28	70.83	50	59.89
-- partial delivery	% traders	31.58	56.94	37.5	37.5	43.96
--no delivery	% traders	36.84	48.61	45.83	45.83	45.05
Dispute with customers						
--late payment	% traders	70.97	73.16	62.5	67.19	69.07
--partial payment	% traders	67.74	66.84	47.79	60.94	61.28
--no payment	% traders	63.71	60	50	53.13	57.39
--renegotiate price	% traders	44.35	40.53	23.53	40.63	36.96
Total number of purchase disputes	*means*	19.67	47.57	18.85	34.88	31.66
	s.d.	56.62	73.54	48.04	51.31	62.17
% resolved through kebele courts	*means*	0	0.06	3.94	0	0.98
	s.d.	0	0.62	18.73	0	9.36
Total number of sales disputes	*means*	73.47	50.07	20.89	34.72	46.08
	s.d.	106.46	66.20	41.18	46.46	73.59
% resolved through kebele courts	*means*	0.10	0.12	1.04	0.00	0.33
	s.d.	0.48	0.78	10.21	0.00	5.12
N		124	190	136	64	514

Source: IFPRI/ILRI survey 2002

Commercial Activities

In this section, we use data collected on the last completed wholesale transaction. Information was collected on the last completed transaction undertaken by respondents. A 'transaction' is essentially a purchase of goods that is assembled by the trader in the supply market, transported to the sales market, and sold over a period of time.

As shown in Table 11, the implication of traders' weak asset base is that grain traders' commercial operations are relatively narrow in scope. For a given transaction, traders engage in short distance trade (67 kilometers on average), few storage days (on average 27 days), and small transaction size (65 quintals). These results suggest that traders do not capture returns to arbitrage opportunities over space, time, or form. Because their activities are limited to short distance and short time periods and small quantities, they do not capture economies of distance, scale, or scope. They are also limited in their capacity to respond to market opportunities in markets outside of their regular channels. We also find that, at lower working capital levels, there is virtually no long-distance transport, which represents a constraint on the ability of traders to capture gains of spatial arbitrage and to expand the scope of markets (Table 12).

Table 11--Commercial activities for grain traders by region

		Tigray	Amhara	Oromia + Dire dawa	Addis Ababa	Total
Kms transported	Mean	66.27	72.68	84.43	16.75	66.75
	S.d.	170.55	150.19	131.72	70.85	144.42
Storage days	Mean	43.52	25.03	21.17	11.56	26.88
	S.d.	68.34	34.18	31.37	18	44.39
Purchase lot size (quintal)	Mean	51.97	64.24	80.34	61.66	65.22
	S.d.	81.86	175.77	172.33	91.24	148.09
Sale lot size (quintal)	Mean	39.31	53.73	68.73	55.17	54.4
	S.d.	75.48	171.18	154.21	92.33	139.92
Unit of purchase						
% quintal		100	100	99.26	100	99.81
Unit of sale						
% kilogram		0	0	1.47	0	0.39
% quintal		100	100	97.79	100	99.41
% Personal travel		23.77	20.54	32.09	1.59	22.02
% Purchase intermediary		54.04	36.84	31.54	6.25	35.82
% Sales intermediary		5.65	6.35	24.22	1.59	10.12
% Supply bags		51.61	72.11	90.44	89.06	74.12
N		124	190	136	64	514

Source: Trader survey of IFPRI/ILRI. 2002

Table 12--Commercial activities for grain trader by working capital Tercile

		Tercile1	**Tercile2**	**Tercile3**	**Total**
kms transported	*means*	44.02	73.18	92.14	66.75
	s.d.	114.7	157.44	162.56	144.42
storage days	*means*	23.57	26.88	32.01	26.88
	s.d.	37.23	47.96	50.08	44.39
purchase lot size (quintal)	*means*	31.17	57.74	115.42	65.22
	s.d.	61.47	75.65	237.5	148.09
sale lot size (quintal)	*means*	24.5	45.8	100.56	54.4
	s.d.	56.95	61.92	228.19	139.92
unit of purchase					
- kilogram		0	0	0	0
- quintal		100	99.32	100	99.81
unit of sale					
- kilogram		0	0	0.62	0.39
- quintal		100	99.32	99.38	99.41
Number of suppliers	*means*	9.49	8.18	14.45	10.61
	s.d.	73.42	21.97	38.81	50.79
Number of customers	*means*	8.18	11.08	16.35	11.59
	s.d.	13.93	16.58	24.65	18.77
% Personal travel		17.58	25	25.95	22.02
% with purchase intermediary		30.05	42.18	34.81	35.82
% with sales intermediary		5.49	6.9	19.11	10.12
% with supply bags		69.89	78.23	77.64	74.12
N		**186**	**147**	**161**	**494**

Source: Trader survey of IFPRI/ILRI. 2002

MARKETING MARGINS AND COSTS

Looking further at trader efficiency, marketing margins and profits are presented in Table 13. Traders in Ethiopia operate on gross margin rates of 12 percent on average, that is, the sale price is 112 percent of the purchase price. This is a relatively small band, in comparison with above 50 percent in other countries in sub-Saharan Africa (Fafchamps and Gabre-Madhin 2001). The implications of this are that traders do not add significant value or services between purchase and sale. Traders' net margins are calculated by subtracting total marketing costs from the gross margin. While net margins vary widely within the regions, their absolute levels appear to quite modest, with an average net margin of Birr 0.60 per quintal or some 7 percent of the gross margin. However, net margins are considerably higher in the Dire Dawa market, where net margins are Birr 17 per quintal, and represent 19 percent of the gross margin. This would suggest that the Dire Dawa market is less efficient in that profits are greater in this market. This is directly evidenced in the price trends discussed earlier in which the Dire Dawa market appeared less responsive to overall price trends.

A closer look at the structure of marketing costs reveals that sacking, handling, and transport are the largest components of the costs (Table 13). Sacking and handling costs are particularly high because of the need to off-load, inspect, and re-load the grain before the transaction is completed. That is, due to the absence of a system of grades and standards inspection and certification and limited recourse to legal enforcement in the case of cheating, traders are forced to conduct inspection themselves. This adds significantly to the cost of handling. Thus, the share of handling and sacking costs amount to a significantly greater share than transport, even for traders in regional surplus and deficit markets, located further away from the central markets. These findings suggest that, given the short distances and small lot sizes,

there is considerable scope for reducing handling and sacking costs relative to other value-adding activities such as increased long-distance transport and storage.

In sum, we conclude on the basis of the analysis of the data that grain traders remain micro-enterprises, with a weak asset base, particularly due to their financial capacity constraint. This implies that their operations remain limited in terms of spatial and temporal arbitrage. We find that as, working capital increases, the scale and scope of trading activities increase.

We find that firms operate in an environment characterized by high transaction costs related to searching for market information, quality and quantity assessment, and contract enforcement. Traders do not benefit from a public market information system and they appear to operate in a legal vacuum, with virtually no recourse to the courts. The risky environment and high costs lead to trade entirely on cash terms for immediate delivery. We see limited evidence of increasing sophistication compared to an earlier study.

We find evidence of interesting contractual arrangements both between traders as well as with farmers. A significant share of traders received and extended supplier credit. They also, in limited instances, advance payment to farmers and other traders, in particular. The terms of these forward contracts are largely to lock in the price at the contract, which is standard. What is not clear are the enforcement issues that arise.

Finally, in terms of arbitrage and profit behavior, we confirm results obtained in an earlier study that traders generally operate on narrow margins, although it should be noted that, profits are considerably higher in Addis Ababa and Dire Dawa than in the regional and woreda markets.

Table 13--Marketing margins and variable costs for grain trader by region

		Tigray	Amhara	Oromia + Dire dawa	Addis Ababa	Total
Gross margin rate	*means*	1.12	1.09	1.2	1.09	1.12
	s.d.	0.27	0.19	0.44	0.32	0.31
Total marketing cost	*means*	12.80	6.46	9.77	3.22	8.46
	s.d.	22.08	8.38	12.60	5.11	14.06
% total cost for sack	*means*	21.77	32.34	34.45	45.02	32.07
	s.d.	29.39	34.82	34.05	28.63	33.29
% total costs for handling	*means*	32.21	32.35	23.34	44.22	31.38
	s.d.	31.62	31.63	26.81	27.41	30.42
% total costs for intermediaries	*means*	16.87	8.12	6.1	3.16	8.98
	s.d.	27.64	17.32	11.98	11.69	19.09
% total costs for transport	*means*	22.43	25.35	22.49	5.07	21.28
	s.d.	35.97	36.03	32.13	20.04	33.83
% total costs for road payment	*means*	0.68	0.04	1.46	0	0.43
	s.d.	0.73	0.36	4.8	0	2.61
% total costs for storage	*means*	0.58	0.32	0.95	0.26	0.54
	s.d.	6.22	3.78	6.51	2.09	5.13
% total costs for personal travel	*means*	1.00	0.99	1.23	0	0.93
	s.d.	3.54	3.64	5.03	0	3.84
% total costs for market taxes	*means*	1.34	0.01	8.35	0.33	2.64
	s.d.	5.78	0.1	18.14	2.65	10.51
% total costs for telephone	*means*	0.49	0.49	1.63	0.84	0.85
	s.d.	2.42	3.55	6	4.3	4.28
% total qty lost during transport	*means*	0.08	0.06	0.16	0.11	0.9
	s.d.	0.53	0.38	0.64	0.64	7.62
% total qty lost during storage	*means*	0.75	0.41	0.25	0.34	0.1
	s.d.	2.36	1.59	0.76	1.35	0.53
net margin (sale price-purch price-cost)	*means*	(0.09)	(0.67)	6.33	2.28	1.69
	s.d.	21.18	15.71	45.31	11.32	27.63
% net margin/gross margin	*means*	6.89	16.18	27.56	37.33	19.56
	s.d.	239.38	187.37	128.28	64.30	177.85
N		**124**	**190**	**136**	**64**	**514**

Source: Trader survey of IFPRI/ILRI. 2002

Notes: Margin rate = Sale price/purchase price
Sack cost is adjusted for number of times sack is used
Handling includes all loading and off-loading in a complete transaction
Transport and storage loss are calculated as the value of the quantity loss at the purchase price.
Net margin = sale price-purchase price-total marketing cost

SPATIAL EFFICIENCY OF MAIZE AND WHEAT MARKETS IN ETHIOPIA[4]

Asfaw Negassa,[a] Robert Myers,[a] and Eleni Gabre-Madhin[b]

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ABSTRACT

In the context of on-going market reform in developing countries, there is a need for an improvement in the existing methods of spatial market efficiency analysis in order to better inform the debate toward designing and implementing new grain marketing policies, institutions, and infrastructure that facilitate the emergence of a well developed and competitive grain marketing system. The standard parity bounds model (PBM), while it overcomes many weaknesses of the conventional methods of spatial market efficiency analysis, does not allow for the test of structural changes in spatial market efficiency as a result of policy changes. In this paper, building on the standard PBM, we develop an extended parity bounds model (EPBM). The EPBM is a stochastic gradual switching model with three trade regimes. The EPBM is estimated by maximum likelihood procedure and allows for tracing the time path and structural change in spatial market efficiency conditions due to the policy changes. We applied the EPBM to analyze the effect of grain marketing policy changes on spatial efficiency of maize and wheat markets in Ethiopia. The results show that the effect of policy changes on spatial market efficiency is not significant statistically in many cases; there is high probability of spatial inefficiency in maize and wheat markets before and after the policy changes. The implication of these results is that maize and wheat markets are characterized by periodic gluts and shortages,

[4] From the paper, "Grain marketing policy changes and spatial efficiency of maize and wheat markets in Ethiopia", Markets, Trade and Institutions Division Discussion Paper No. 66, IFPRI, Washington, D.C., by Asfaw Negassa, Robert Myers and Eleni Gabre-Madhin 2004. The full paper is available at http://www.ifpri.org.

which can undermine the welfare of producers, grain traders and consumers. It is also observed that the nature of spatial inefficiency for maize and wheat markets is different implying that the two commodities might require different policy responses in order to improve spatial market efficiency. Maize traders made losses most of the time while wheat traders made excess profits most of the time covered by the study.

DISCUSSION

Discussants' comments by Dr. Alemayehu Seyoum:

I. Policy change

The paper explores the impact of a policy change in the form of a reorganization of the EGTE that occurred in 1999. It would put the analysis in perspective if the paper briefly outlines:

a. The main aims of the reorganization;
b. The significance of the reorganization in the context of the broader market reform process that started roughly 7 years earlier; and
c. The potential impact of the reorganization on spatial market efficiency.

Among other things, these would help clarify what kind of impact should be expected from the change. But, I would hasten to add that the technique developed in the paper could be applied to the analysis of any other relevant policy change, and as such is a contribution its own right.

II. Identification problems

The paper mentions, on p.15, that separating the impact of the 'policy change' and other changes is difficult. This is understandable. However, it would be useful to have some discussion of:

a. What the key confounding factors are; and

b. How these factors may modify the results.

For instance, could volatility of production or supply (if food aid and food imports are added) drive the behavior of the markets?

Market prices are likely to strongly respond to supply volatility as illustrated by the collapse of grain prices in 2001/02. As a consequence, such volatility is likely to generate some influential outliers in the price series. Such outliers, if any, should be identified and their impact assessed. More generally, some analysis of the time-series properties of the price series (stationarity, seasonality) could be useful. A helpful reference, in this regard, is Zanias (1999) [Zanias, George P. (1999). 'Seasonality and spatial integration in agricultural (product) markets,' Agricultural Economics, 20, pp. 253-262.]

Such explorations may shed some light on the results concerning maize markets (frequent losses) and wheat markets (monopolistic structure).

III. Measurement Problems

The paper acknowledges, rather grudgingly, the measurement problems associated with price differentials and, particularly, transfer costs. One way of assessing the significance of these problems is to use alternative measures. For instance, what would be the impact of:

a. Using transfer costs one standard deviation higher than the mean; and

b. Increasing the normal profits of traders from seven percent to, say, ten percent.

Obviously, this will involve some work. However, as a rough sensitivity analysis it would be useful to assess the significance of the measurement problems particularly in light of the fact that the paper attributes some of its results to these problems (see footnote 17 on p.27; the caveats in

the last paragraphs on p.36 repeated on p.49 in the paper, “Grain marketing Policy Changes and Spatial Efficiency of Maize and Wheat Markets in Ethiopia).

IV. Explanation of results

Economic theory predicts that market imperfections due to information, incentive, and enforcement problems lead to too little trade (including no trade) or too much trade. The trick is to try to isolate, within the bounds of available information, which of these problems explain the market outcomes found by the paper. Hence, the paper would be more effective if it clearly and explicitly organizes its explanations and corresponding evidence around these problems. The information from the two traders surveys may be better deployed:

a. To verify the extent to which binding credit constraints are faced by grain traders, particularly maize traders (this will provide evidence for the suggested explanation that maize traders sell at a loss because of liquidity constraints);
b. To assess the extent of bankruptcies or turnover of traders in the grain trade (this will help verify if losses are frequent in maize trading);
c. To measure the entry cost which are apparently low in maize trade and apparently high in wheat trade (this will help in explaining the apparently high degree of competition in maize markets and the seemingly monopolistic structure of wheat markets); and
d. To explore whether potential enforcement problems have led to trust-based long-term relations among traders, since honoring contacts even at a loss in the short-term may explain why trade occurs even when returns to the activity is low or negative.

SESSION IV: PERFORMANCE OF LIVESTOCK MARKETS

Livestock Marketing in the Ethiopian Highlands: Changes in Structure and Conduct Since 1991

Samuel Benin, Mohammad Jabbar and Simeon Ehui

Trader Behavior and Transactions Costs in Live Animal Marketing in Ethiopian Highland Markets

Mohammad Jabbar and Samuel Benin

LIVESTOCK MARKETING IN THE ETHIOPIAN HIGHLANDS: CHANGES IN STRUCTURE AND CONDUCT SINCE 1991

Samuel Benin,[a] Mohammad Jabbar,[b] and Simeon Ehui[c]

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[b]International Livestock Research Institute
[c]The World Bank

ABSTRACT

Current knowledge of the livestock marketing system in Ethiopia is poor and inadequate for designing policies and institutions to reduce inefficiencies in the system and improve the distribution of livestock. This paper addresses this knowledge gap by using survey data from 38 livestock markets conducted in 2002 in the highlands of Ethiopia to examine the structure and conduct of livestock markets. It also examines changes in the structure and conduct since 1991 when the agricultural development-led industrialization and market liberalization policies and strategies were launched. The findings suggest that improvement in stocking facilities can help to increase and sustain marketing activities throughout the year and, thus, reduce problems associated with seasonality and unstable prices. In addition, improvement in credit, licensing, and means of enforcing market contracts will also be important.

INTRODUCTION

Ethiopia has the largest population of livestock in Africa, contributing annually about 30-35 percent of agricultural gross domestic product (GDP) and 13-16 percent of total GDP. Livestock are essential in improving food security and reducing poverty in smallholder farming systems that exist in Ethiopia. In these systems, mixed crop-livestock especially, oxen are the main means of draft power, equines provide the main

form of transport, and livestock in general are an important source of food, cash income, manure, and insurance against crop failure.

Despite its importance in improving food security and reducing poverty, current knowledge of the livestock marketing system is poor and inadequate for designing policies and institutions to reduce inefficiencies in the system and improve the distribution of livestock. The recent review of the studies on livestock marketing in Ethiopia by Ayele Solomon et al. (2003) shows the knowledge gap on the topic.

Filling this gap is the objective of this paper. Survey data from 38 live animal (livestock) markets conducted in the highlands of Ethiopia in 2001/02 are used to examine the structure and conduct of live animal markets, and examine changes since 1991 when the agricultural development-led industrialization (ADLI) and market liberalization policies and strategies were launched.

In the next section, the surveyed markets and data collected are presented. This is followed in section 3 by a descriptive analysis of the data regarding livestock market situation, structure and conduct. Then changes in the above aspects of the market since 1991 are presented. In section 4, a synthesis of the descriptive results and implications for improving livestock marketing in the Ethiopian highlands are presented. Conclusions and are presented in section 5.

SURVEY AND DATA

Market-level and trader-level surveys were carried out in 38 livestock markets in the highlands of Amhara, Oromiya and Tigray regions and Dire Dawa special region

between December 2001 and June 2002.[5] These markets were randomly selected from those associated with the project on *Policies for Sustainable Land Management in the Highlands of Ethiopia* on which the markets component project was developed (reference). Table 1 shows the list of markets surveyed by region, zone, and district (*wereda*).

[5] From these 38 markets, 131 livestock traders were randomly selected to collect information on traders' assets, business practices, trading activities, transaction costs, margins and profits, and problems. These data are analyzed in a separate paper by Jabbar and Benin (2004) presented at this workshop.

Table 1--Names of markets surveyed, by region, zone and district in the highlands of Ethiopia

Region	Zone	District	Market
Amhara	North Gonder	Gonder Zuria	Gonder
	South Gonder	Farta	Debre Tabor
	East Gojjam	Machakel	Amanuel
		Gozamen	Debre Markos
	West Gojjam	Bahir Dar Zuria	Bahir Dar
			Tis Abay
		Bure Wonberma	Bure
	North Shewa	Gerakey	Mehal Meda
		Mida	Meranya
	South Wollo	Kalu	Habru
		Tuluhedere	Haik
		Dessie Zuria	Dessie
Oromiya	West Shewa	Chelia	Jaji
	West Wellega	Ayira Gulibo	Gulibo
		Gimbi	Gimbi
		Lalobabie	Inango
	East Wellega	Guto Wayu	Nekemphe
	Illubabor	Algesachi	Algae
		Metu	Metu
			Nopha
	Arsi	Dugda Tiyo	Assela
	West Harrege	Tulo	Debeso
		Chiro	Asbe Teferi
Dire Dawa	Dire Dawa	Dire Dawa	Dire Dawa
Tigray	South Tigray	Hintalo Wejerat	Adigudum
		Enda Mokoni	Maychew
		Alimata	Alimata
		Ambalage	Adishiho
	Central Tigray	Enerta	Quiha
		Kolla Tembem	Abiy Adi
		Adwa	Adwa
		Tahtay Koraro	Axum
			Wukro Maray
		South Mekelle	Mekelle
	East Tigray	Shebe Tsaedaembo	Edaga Hamus
		Atsbi Wenberta	Atsbi
		Gonta Ageshum	Adigrat
	North-west Tigray	Tatay	Shire

The main respondents are key informants, representatives in the market, or experts from trade bureaus, municipalities, and agriculture bureaus. Structured questionnaires were used to collect information on the market situation, structure and conduct of livestock traders, infrastructure, institutions, and mechanisms of livestock distribution. In addition, information was collected on changes in the above since 1991,

when the current government came to power and launched the agricultural development-led industrialization (ADLI) and market liberalization policies and strategies.

SITUATION, STRUCTURE AND CONDUCT OF LIVESTOCK MARKETS, AND CHANGES SINCE 1991

Market situation

Classifying livestock markets as primary, secondary or terminal is common. In this survey, however, there was no information to use to estimate the proportion of markets that fall into each category. However, about 78 percent of the markets surveyed served as an assembly point of animals for other markets. This suggests that several of the markets did not play a significant role in the distribution of livestock in the highland areas. For those serving as assembly points, livestock were assembled over relatively short distances, averaging 44 kilometers (km).

Use of stocking facilities (including fencing and feeding and watering troughs) by traders was not common. Use by some traders was reported in only 37 percent of the markets. Livestock markets are often under the control of local authorities, and are normally convened in an open area, which is occasionally fenced. The individual sellers do not have any fencing and they stand about with their livestock close by, while the buyers circulate to bargain with the sellers. When the animals have to be fed, hay is usually brought and put on the ground. In the markets where use of stocking facilities by traders was reported, very few traders (4 per market on average) actually used them. Examining the change in availability of stocking facilities since 1991 shows that the situation has remained unchanged in a majority of the markets (24 of the 38 markets). Twelve of the markets reported an improvement in the availability of stocking facilities, while the remaining two markets reported a decrease.

Access to credit seems limited. Although financial institutions that provided loans to live animal traders were present in 41 percent of the market towns, only 25 percent of the traders in those places had access to loans.

Market structure

To understand the market structure, we examine the number and/or change in the number of different types of traders (wholesalers, retailers and brokers), private live animals transporters, and meat processors. Information on regulation and taxation, inspection, enforcement, and trade associations are also analyzed. Although most of the information here was collected and analyzed by type of animals (i.e., cattle, small ruminants (sheep and goats), and pack animals), we only present the results with respect to cattle and small ruminants, as these were the main types of livestock that were traded. However, separate discussion for cattle and small ruminants are presented only when there are significant differences.

Traders and infrastructure

The total number of traders, including wholesalers, retailers and brokers, increased substantially since 1991, with the number of retailers increasing the most, followed by wholesalers and then brokers (Figures 1 and 2).

Figure 1--Change in number of cattle traders

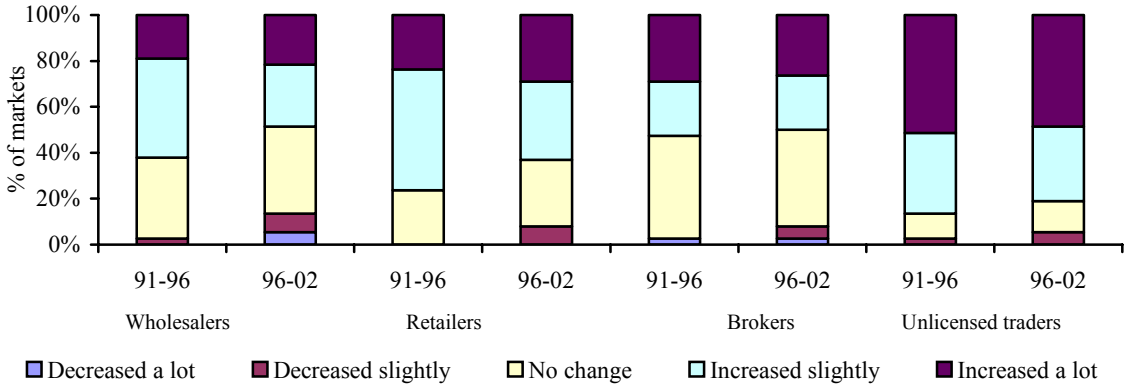
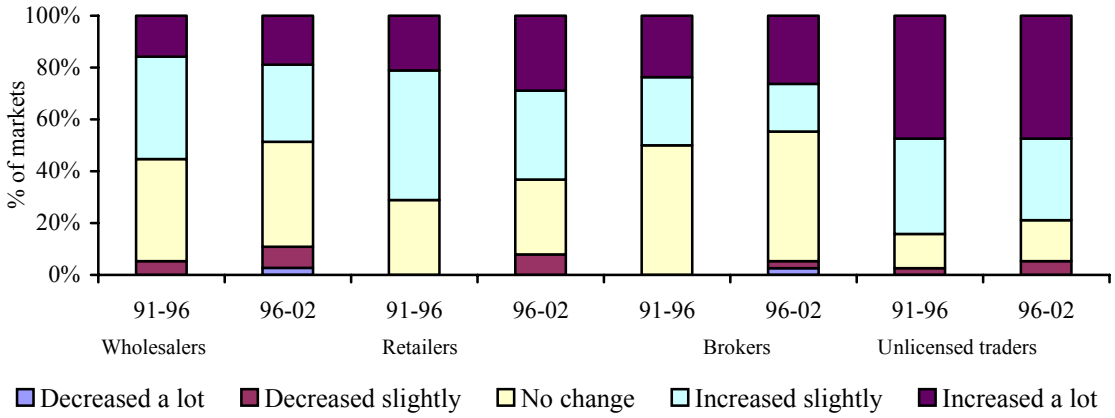


Figure 2--Change in number of sheep and goats traders

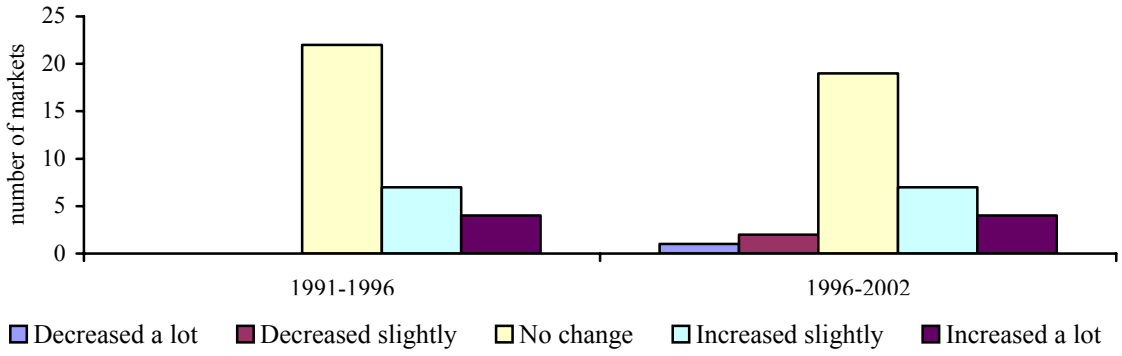


The increment in the number of traders was larger between 1991 and 1996 compared to that in the period between 1996 and 2002. For example, while 75 percent of the markets reported that the number of retailers increased by a little or a lot between 1991 and 1996, about 65 percent reported a similar change between 1996 and 2002. Very few of the markets reported a decline in the number of traders, which mostly occurred between 1996 and 2002. A remarkable observation is the change in number of unlicensed traders. For example, about 80 percent of the markets reported that the number of unlicensed

livestock traders increased by a little or a lot between 1996 and 2002. Note that the pattern of change in the number of traders (either licensed or unlicensed) was identical for both cattle and sheep and goat traders (Figures 1 and 2).

There were not many private transporters in the business of transporting live animals. On average, the number of private transporters operating in each market town was about six, with a mere 7 percent of them transporting live animals. Almost all of the transporters were involved with grain and other crop products. The situation has changed in several markets since 1991, although it became worse in some between 1996 and 2002 (Figure 3).

Figure 3--Change in number of private transporters



Between 1996 and 2002, about 42 percent of the markets reported that the number of private transporters operating in the market town had increased by either a little or a lot, 47 percent reported that the situation had not changed, while the remaining 11 percent of the markets reported that the number of private transporters operating in the market town had declined by either a little or a lot.

Meat processors play a significant role in the distribution of livestock for consumption purposes. The average number of slaughterhouses, butcheries, and

restaurants that were present in the market towns almost doubled or more than doubled between 1991 and 2002 (Table 2).

Table 2--Average number of livestock and meat processors in the market towns, by year

Type of processing agent	1991	1996	2002
Slaughterhouse	0.51	0.73	0.92
Butchery	6.05	8.84	12.62
Meat factory	0.03	0.03	0.03
Meat sellers or restaurants	6.92	11.57	6.92

Restaurants and butcheries were by far the most common, averaging 16 and 13 per market town in 2002, respectively. The number of meat-processing factories, however, remained unchanged. Actually, only one of the market towns had a meat-processing factory.

Regulation, taxation and enforcement

As mentioned earlier on, livestock markets are primarily under the control of local authorities. We found that several institutions, including the city council, *wereda* administration, the Ministry of Trade and the Inland Revenue Service, were responsible for different activities with respect to regulation and infrastructure development. It was clear in almost all of the markets (more than 95 percent) which authority was responsible for levying and collecting taxes and providing security. In several of the markets (24-37 percent), however, it was not known who was responsible for licensing, health issues or infrastructure development (Table 3), leading to poor inspection and maintenance of the market facilities.

Table 3--Institutions responsible for aspects of market development

	Licensing and entry	Taxation	Security	Health concerns	Infrastructure
City council	2	11	16	7	11
Wereda administration	1	2	8	5	3
Ministry of Trade	15	2	0	0	0
Inland Revenue Service	2	10	0	0	0
Private operators	3	4	3	3	1
Others	0	4	8	12	5
No one	4	3	2	2	3
Don't know	11	2	1	9	14
Total	**38**	**38**	**38**	**38**	**38**

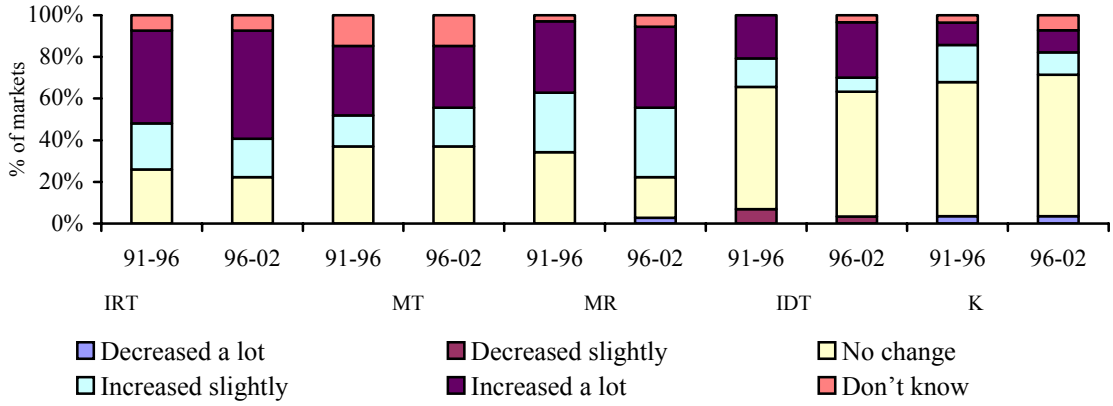
For example, only 24 percent of the markets reported that traders' stocking facilities were inspected regularly. Table 3 also shows the responsible authorities for different aspects of market development in those markets where the responsible authorities are known. The results show clearly that different authorities are responsible for carrying out the same activities in different markets, or that a particular authority is responsible for different activities in the same market. Regarding regulatory certain activities, however, there are some dominant authorities that are responsible. For example, licensing and entry were primarily controlled by the Ministry of Trade in most of the markets (54 percent). Taxation was equally controlled by the city council and the Inland Revenue Service. Security, health issues and infrastructure development were controlled mostly by the city council, followed by the *wereda* administration. The private sector was also involved in all aspects of regulation, enforcement and infrastructure development in about 5-10 percent of the markets.

An important aspect of market structure is barriers to entry or obtaining a trading license, especially given the huge influx of unlicensed livestock traders. It is surprising

that in about 55 percent of the markets, it was reported that livestock traders were not required to obtain a license to operate in the market. On the other hand, obtaining a license where it was required did not seem to be much of a problem either, as it was reported in 65 percent of those markets that it was not difficult to obtain a trading license. Even in markets where it was reported that a trading license was not required, in about 67 percent of them, it was felt that obtaining a license would not be difficult. These results suggest that entry and exist is very easy.

Various forms of taxes were levied on traders' transactions or on traders operating in the market. These include municipality market levy (occurring in 84 percent of the markets), inland revenue tax (37 percent), infrastructure and development tax (34 percent), municipality tax (32 percent), and *kella* (24 percent).[a] [6]We found that the level of taxes has increased in many markets since 1991 (Figure 4).

Figure 4--Change in level of taxes



Notes: IRT is inland revenue tax; MT is municipality tax; ML is market levy; IDT is infrastructure and development tax; and K is *kella*.

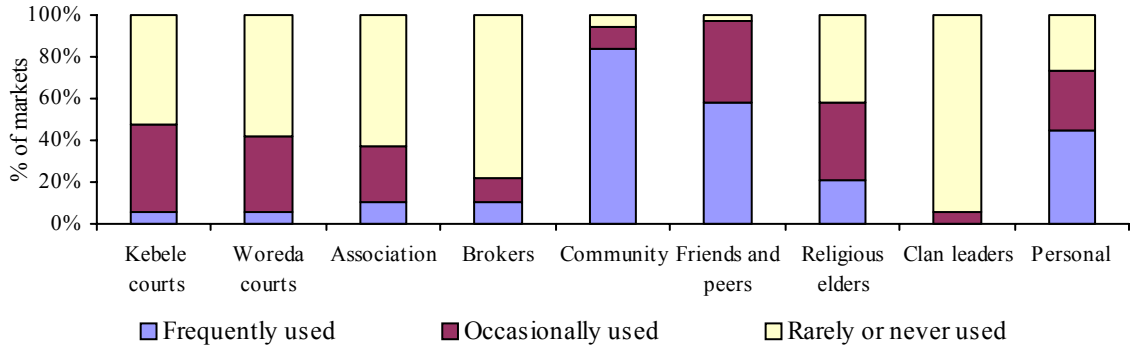
Most of the markets (50-75 percent) reported that municipality market levies, inland revenue taxes and municipality taxes have increased by either a little or a lot since

[6] *Kella* is a form of tax collected at road checkpoints

1991. Regarding infrastructure and development fees and *kella*, a majority of the markets (60-70 percent) reported that they had not changed, although a few of them reported they had declined by either a little or a lot. Note that since the change in taxes is measured by an ordinal index (increased or decreased by a little or a lot or no change), we cannot make any inference regarding change in real value terms due to inflation, for example.

Enforcement of market contracts was primarily done outside of the legal peasant association or district courts. In most cases, traders used community and religious leaders, friends and peers, or personal resolution to settle their disputes (Figure 5).

Figure 5--Means of settling dispute



Market conduct

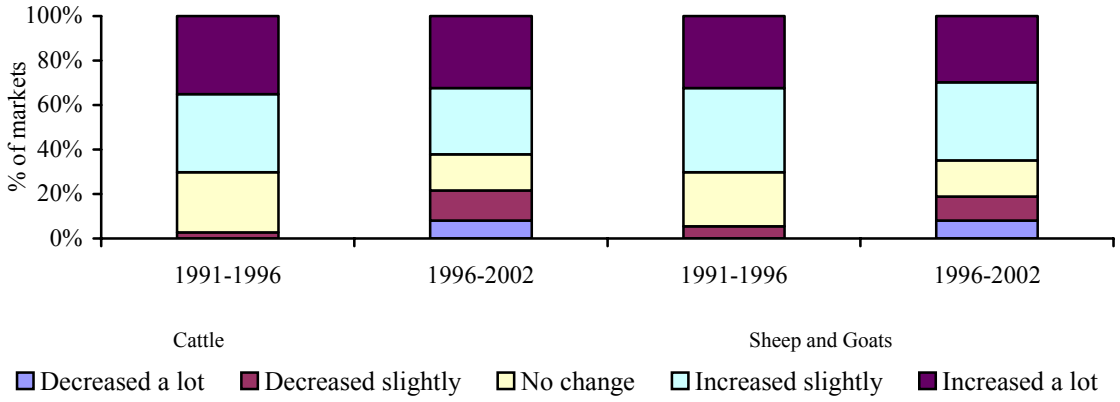
Here we examine traders' specialization and investment behavior, seasonality of marketing activities, competition, property rights and enforcement, grades and standards, problems facing market participants.

Specialization and investment behavior

In most of the livestock markets, traders engaged in other income-earning activities, including farming, services, and other commodity trading. It was only in a few of the markets (about 11 percent) that some of the traders specialized in livestock trading

and did not engage in other income-earning activities. Regarding species specialization, however, many of the traders specialized in either cattle or small ruminants. This type of specialization has increased since 1991 in most of the markets (65-70 percent; Figure 6).

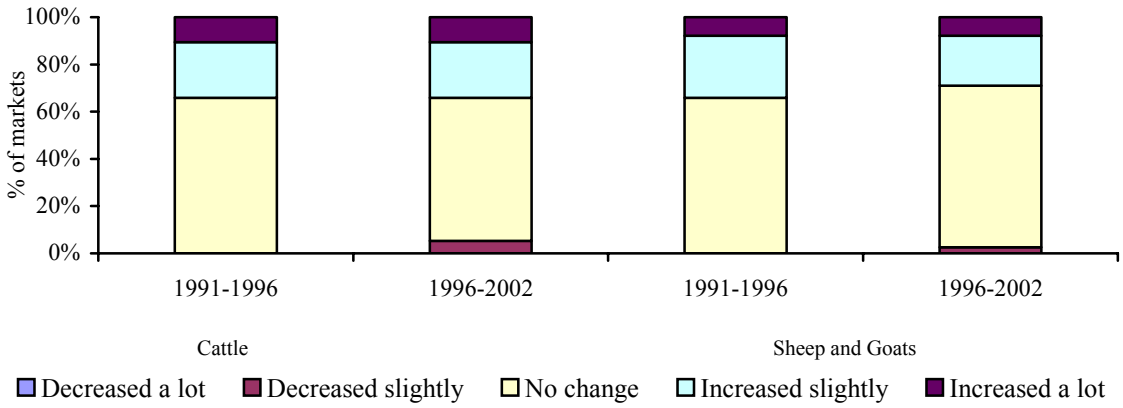
Figure 6--Change in number of specialized species trading



Between 1996 and 2002, however, several of the markets (about 20 percent) reported a decline in specialized species trading activities.

Investment behavior of traders in vehicle purchases, expanding stocking facilities, etc. has not changed by much since 1991 (Figure 7), compared to changes in other aspects of the markets. About 34 percent of the markets reported that traders' investments had increased either by a little or by a lot. In a few markets (less than 5 percent), however, it was reported that traders' investments had declined since 1996. As the change in investments was measured by an ordinal index (increased or decreased by a little or a lot or no change), we cannot make any inference about the change in the real value of investments.

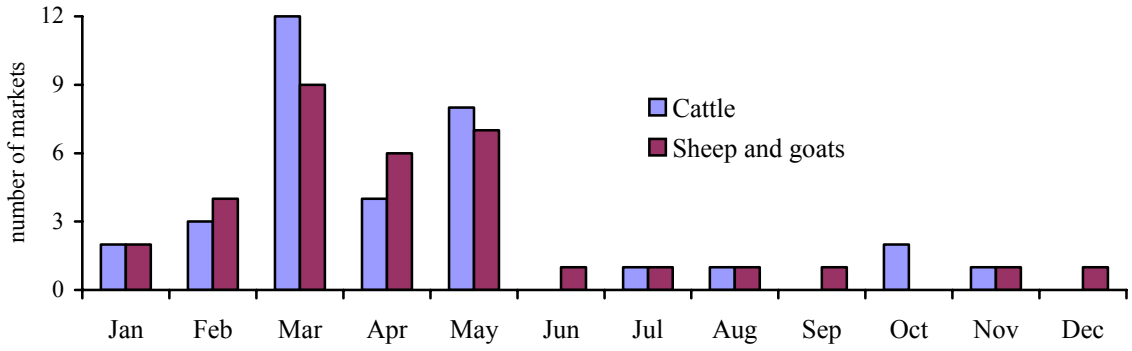
Figure 7--Change in traders' investments



Seasonality and competition

As expected, livestock trading activities tended to be seasonal and were concentrated between January and May (Figure 8).

Figure 8--Seasonality of trading activities

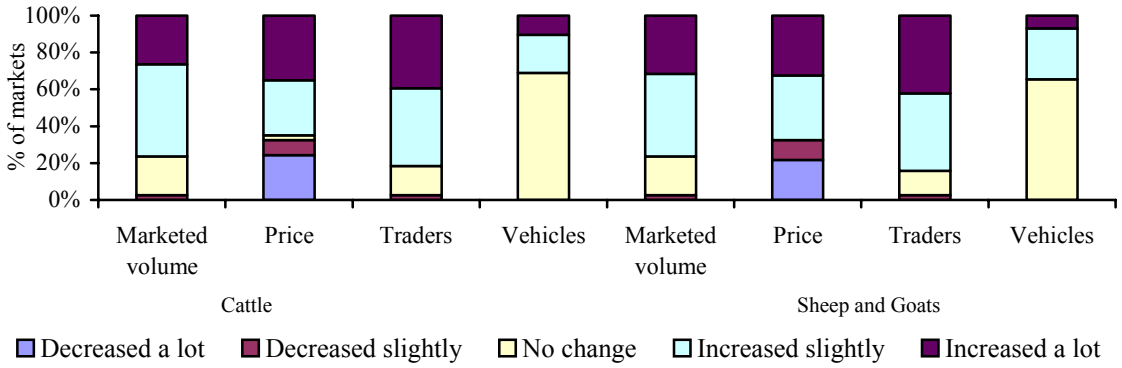


March and May were the two most important months, although cattle trading activities dominated those of sheep and goats. April, February and January were the next in order of importance. Unlike in March and May, however, sheep and goats trading activities dominated. On average, the number of livestock traders increased by about 55 percent between the peak and non-peak months, while the number of livestock transporters increased by about 22 percent. These findings are consistent with common knowledge

and empirical evidence that the volume of livestock sales or purchases and prices are highest during religious festivals (Ehui et al. 2000; Andargachew and Brokken 1993). One of the most celebrated religious holidays in Ethiopia is Easter, which occurs in April. April and May also coincide with the beginning of the cropping season when farmers tend to sell off livestock to purchase key farm inputs or even food consumption items, as food stocks (especially grain) from the previous harvest is depleted.

We also examined how seasonality in livestock trading (including marketed volume, prices, and number of traders and transporters) has changed over the years. In most of the markets (65-75 percent), seasonality with respect to marketed volume, prices and number of traders had increased either by a little or a lot since 1991 (Figure 9).

Figure 9--Change in seasonality of trading



That is, these aspects of livestock marketing have tended to be concentrated more in a few months or, in other words, the difference between the peak and non-peak activities has increasingly widened. In some of the markets (about 25 percent), however, seasonality in prices has declined since 1991. Seasonality in the number of livestock

transporters has remained fairly stable since 1991, increasing in about 30 percent of the markets only.

A very important aspect of market conduct is price determination. Livestock prices in the markets were not fixed from outside. Prices are determined by supply and demand, and in most of the markets by direct buyer-seller negotiation. In a few of the markets (about 18 percent), however, prices were mostly negotiated through a broker.

Property rights enforcement

One of the remarkable findings from the surveys was the sense of a high level of security in the market place. It was only in one market that some level of insecurity was expressed, due to the rare incident of theft. In addition to the sense of a high level of security, there was a general feeling that the level of security had increased since 1991. For example, in 81 percent of the markets, it was felt that the level of security had increased by either a little or a lot. In the remaining 19 percent of the markets, it was felt that the level of security had not changed.

Grades, standards, and marketing problems

In most developing countries, one of the major constraints in the development of markets in general and livestock markets in particular is the limited use of grades and standards. In most cases, breed is commonly used for distinguishing among a particular species of livestock. In a little over one-half of the markets surveyed, known names were used to refer to different breeds that were traded in the markets. However, other factors were also used. For cattle trading for example, region of origin, color and appearance, size, and horn, in that order of importance, were also used to determine breeds. In the case of small ruminants, color and appearance, region of origin, and hair or wool were

also used. To differentiate level of quality within a particular breed, body condition and weight were used for both cattle and small ruminants.

Several problems facing the markets were identified. Table 4 shows how the problems were ranked. The most common problems mentioned, in order of importance, were unstable prices, too low or high prices, poor quality of breeds, weak market infrastructure (trekking routes, watering holes, information, etc.), and unlicensed traders.

Table 4--Ranking of marketing problems (% of markets reporting), by species

Marketing problem	Cattle		Sheep and goats	
	1st	2nd	1st	2nd
Too low/high prices	13.5	5.6	11.1	5.6
Unstable prices	27.0	5.6	30.6	2.8
Poor quality of goods	10.8	13.9	8.3	16.7
Absence of grades and standards	--	5.6	--	5.6
Multiple taxes or non-transparent taxation	--	8.4	--	8.4
Difficulties in obtaining license	--	--	--	--
Unlicensed traders	8.1	11.1	8.3	16.7
Weak infrastructure (trekking routes, etc)	5.4	11.2	5.6	11.2
Limited credit access	5.4	8.3	5.6	8.3
Weak legal system of contract enforcement	--	2.8	--	2.8
Absence of government support	2.7	2.8	2.8	2.8
Weak demand	5.4	5.6	5.6	5.6
Other	21.6	19.4	22.2	13.9

1st and 2nd mean first and second most important, respectively.

Unfortunately, there were no trade associations in any of the markets, and none of the traders in any market got together to collectively discuss and try to solve the problems facing them. This is unlike in grain or coffee markets where trade associations exist and traders collectively discuss problems (Wolday Amha and Eleni Gabre-Madhin 2003).

SYNTHESIS OF RESULTS AND IMPLICATIONS

Although the contributions of livestock to the Ethiopian economy and the livelihoods of smallholders are large, the livestock production system is not adequately market oriented. In the highland areas, cattle are mainly kept for farm draft power and milk production, small ruminants for occasional sale, and equines for transportation. As such, strategic production for the market is not evident, except where sales are targeted to religious holidays such as Easter. Consequently, livestock marketing is not well developed, compared to grain and coffee marketing for example. Livestock marketing is characterized by small-scale businesses with very few assets, personalized trading (mostly with known people), and trading over very short distances. The implication is that animals have to be traded several times in order to reach the large and distant terminal markets. This has the tendency of increasing handling costs, thereby raising retail and suppressing farm-gate prices.

Seasonality in marketing is a common phenomenon with most agricultural products, especially in developing countries. However, the problem of unstable prices and too high or low livestock prices is tied to targeting sales to a few days only in an entire year (when there is a huge oversupply of livestock) as well as low demand in the rest of the year, especially during religious fasting periods. Increasing and improving stocking facilities so that animals can be stocked in the market for long periods of time can help to stabilize prices. To increase and improve traders' investment in stocking facilities, the credit situation needs to be addressed, as the results show that access to credit by livestock traders was very limited.

The issue of unlicensed traders is unclear. In more than one-half of the markets, it was reported that trading licenses were not required. Whether or not this is legally true is

not clear, as it is likely that traders were stating their disapproval of obtaining a license. Interestingly, in the others where licenses were required, it was generally felt that obtaining a license was not difficult. The same feeling exists even in the markets where it was reported that licenses were not required. This begs the question, why so many unlicensed traders then? This is likely due to the taxation system, as it was reported that multiple and non-transparent taxes was a problem. Since unlicensed traders cannot be taxed (in the legal sense), traders prefer to operate without it. A similar situation exists in grain and coffee markets (Wolday Amha and Eleni Gabre-Madhin 2003). The consequences are loss of revenue for the government and encouragement of informal livestock markets, making enforcement of marketing contracts more difficult.

CONCLUSIONS

Using survey data from 38 livestock markets in the highlands of Ethiopia, this paper examined the structure and conduct of livestock markets, and changes since 1991 when the agricultural development-led industrialization (ADLI) and market liberalization policies and strategies were launched.

Most of the markets seemed ad hoc, as traders mostly convened in an open area with very little, if any, infrastructure development. Use of stocking facilities (fencing and feeding and watering troughs) was rare. For traders with some stocking facilities, the number and quality were poor, and have not improved by much since 1991. Nevertheless, the number livestock traders (wholesalers, retailers and brokers) have increased significantly since 1991. In addition, livestock and meat processors such as butcheries and restaurants have more than doubled, while other processors have remained unchanged.

It was clear in almost all the markets (about 95 percent) which institution was responsible for levying taxes and providing security. In many of the markets (24-37 percent), however, it was not known who was responsible for licensing, health issues and infrastructure development. Thus, it is not surprising that there were many unlicensed traders operating in the markets, and their number has increased substantially since 1991. In addition, there was regular inspection of traders' facilities in a few markets only.

Livestock trading activities are competitive, as there was no monopolistic or collusive price setting. Prices were determined mostly by direct buyer-seller bargaining and occasionally through a broker. There were no legal means (i.e., through a court) of enforcing market contracts, and so traders resorted mostly to elder mediation, friends or personal resolution. As expected, the bulk of trading activities through the year coincided with the most celebrated religious holidays or just before the cropping season when farmers sell livestock to purchase key farm inputs or consumption goods to replenish food stocks from the previous harvest.

Common problems facing the markets include unstable prices (including too high or low prices), poor quality of breeds, and weak infrastructure (trekking routes, watering holes, information, etc.).

REFERENCES

Andargachew, K. and R.F. Brokken. 1993. Intra-annual sheep price patterns and factors underlying price variations in the central highlands of Ethiopia. *Agricultural Economics* 8:125-138.

Ayele, S., A. Workalemahu, M.A. Jabbar, M.M. Ahmed, and B. Hurissa. 2003. Livestock marketing in Ethiopia: a review of structure, performance and development initiatives. *Socio-economics and Policy Research Working Paper 52*. ILRI (International Livestock Research Institute), Nairobi, Kenya.

Ehui, S., S. Benin, and N. Gebreselassie. 2000. Factors affecting urban demand for sheep: The case of Addis Ababa, Ethiopia. *Socio-economics and Policy Research Working Paper 31*. ILRI, Nairobi, Kenya.

Wolday, A. and E. Gabre-Madhin. 2003. An analysis of the structure, conduct, and performance of the Ethiopian grain market. Presented at the Workshop on Harnessing Markets for Agricultural Growth in Ethiopia: Bridging the Opportunities and Challenges, ILRI, Addis Ababa, Ethiopia, 7-8 July 2003.

DISCUSSION

Discussants' comments by Ato Belachew Hurissa, Livestock Marketing Authority

First of all, I would congratulate Dr. Benin and his team for trying to narrow down the knowledge gap on livestock marketing, at least in the highland areas.

The study paper under review has based its facts and analysis on 38 live animal markets of the highland areas. The information gathered has been used to examine:

- The structure and conduct of live animal markets, especially cattle and small stocks and
- Changes made since 1991

My reviews and comments sequentially follow the outline used by the researcher.

Market Situation

Existing classification of markets is based on the number of animals that are weakly supplied at a specific market. Taking this fact into account, the survey could have classified the sample markets. Instead, the survey has simply categorized the markets as assembly points (pp 2). Classification and characterization of each tier would help in identifying the type and level of interventions needed in developing the markets.

In market situation assessments the paper has indicated that:

- Use of stocking facilities (fencing, feeding and watering troughs) by traders was not common.
- The individual sellers do not have any fencing
- When animals have to be fed, hay is usually brought and put on the ground

Unlike the above views of the paper, except at terminal markets, other markets are not equipped with facilities such as feed +water troughs, feed +water supply as animals usually are not kept at the markets for more than 4-5 hours. Moreover, the physical facilities are owned and run by public institutions and so far no private market management has been observed. Therefore, at which stage of the market tier of the study area has the observation been made?

Changes made since 1991

With respect to changes in:

- Total number of traders,
- Private transporters,
- Meat processors,
- Level of taxes,
- Seasonality with respect to volume, prices, etc.

The survey has indicated increase, decrease or no change in the above variables.

However, without an empirical benchmark or baseline information, simply based on the interviews of the respondents, it seems difficult to reach such conclusions.

Traders and Infrastructure

In this respect, the paper indicates that

- Meat processors play a significant role in the distribution of livestock for consumption purposes – is it true?
- The private sector was also involved in all aspects of regulation, enforcement and infrastructure development

Again, does the private sector play a regulatory role?

Seasonality and Competition

It is also indicated that "Livestock sales or purchases and prices are highest during religious festivals. One of the most celebrated religious holidays in Ethiopia is Easter, which occurs in March."

It is true that sales or purchases are high during religious and other festivals. However, unlike as stated in the paper and quoted above, in Ethiopia Easter never occurs in March but in April. The New Year which always occurs in the month of September is equally if not more important than Easter. To this end, the survey conducted by LMA indicates that relatively much higher number of small stock from all corners of the supply sheds flow to Addis Ababa during the New Year period than any other time. Moreover, September is one of the months when farmers face food shortages and are forced to sell their animals.

Synthesis of results and implications

According to the paper, increasing and improving stocking facilities so that animals can be stocked in the markets for long periods can help to stabilize price (pp 9).

Generally, under the prevailing conditions of Ethiopia, animals are brought to market places once or twice weekly and stay for a few hours until the market participants disperse. As per the recommendation made in the paper, keeping animals at market places could only be possible at terminal markets, so to which market structures does the study refer to?

Conclusions

In the conclusion section, the paper states that for traders with some stocking facilities the number and quality were poor and have not improved by much since 1991 (pp10). To my knowledge market facilities are managed by public institutions unless they refer to individual farmers' homesteads or terminal markets.

Finally, these preliminary findings could serve for further research that could be used to study in detail the structure and performance of livestock marketing in all the production systems of the country with the objective of determining different market development options that will result in the well being of the farming community.

Discussant's comments by *Berhanu Gebremedhin, ILRI:*

- Not many studies have been done on livestock markets in Ethiopia so this paper makes an important contribution.
- The consistency of answers across key informants is questionable.
- Credit is an important factor but it is not mentioned here.
- Unless some statistical analysis is done it will be difficult to totally rely on the descriptive analysis presented.
- What is meant by "markets are controlled"?

- An important factor that has been left out is the "age of the animal."
- Poor quality of breed is listed as a problem although it is not clear for which issue this is a problem.

Other questions:

Q : (i) The paper has taken 1991 as the benchmark year but no justification has been given for this. (ii) The periods 1991-1996 and 1996-2002 are compared. Is there any policy change that has affected the structure and conduct of livestock marketing between these periods? (iii) It has been stated that livestock production is not market oriented. This is mostly true for cattle but studies have indicated that farmers raise sheep for the market.

A: (i) Regarding 1991, we tried to take into account the initial year of transition of the Ethiopian government. (ii) The attempt was to break the period into two comparable periods.

Other comments: (i) The paper has not considered the informal cross-border trade in the livestock marketing chain and this is common in the northern highlands and lowland areas. This has great implications for marketing efficiency and policy intervention. (ii) It is critically important to address the livestock marketing supply chain for policy intervention purposes.

TRADER BEHAVIOUR AND TRANSACTIONS COSTS IN LIVE ANIMAL MARKETING IN ETHIOPIAN HIGHLAND MARKETS

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ABSTRACT

A survey of 131 livestock traders in 38 markets in the highlands of Ethiopia provided information on trader behavior and transactions costs. The livestock market is characterized by non-standardized products and lack of information in the public domain about supply, demand and prices. Consequently, livestock trading is largely a personalized business though intermediaries, especially brokers, are used for trading in distant markets. Most traders use their own capital as access to credit, especially formal credit, is very limited. Estimated costs and margins of case transactions show low returns and losses on traders' capital in some cases. Analysis of the structure of variable costs show that most are physical marketing costs. Transactions costs are smaller as most exchanges are conducted in the physical presence of the parties. Unstable price, multiple taxes, non-transparent tax system, limited access to credit and weak demand for the products traded are perceived as major problems of marketing. All the problems are amenable to public policy for improving the market environment and marketing efficiency.

INTRODUCTION

Well functioning markets facilitate easy conversion of products to cash, which further facilitate other exchanges of goods and services required for increased production and consumption. Markets therefore promote specialization and increased productivity and growth through realization of comparative advantage and accessing regional and global markets. Therefore, commercialization and market expansion are essential for exploiting the potential of any commodity in the economic development process. Commercialization also implies greater demand for inputs, information, credit and other services including rules and norms for arranging contracts and their monitoring and enforcement to facilitate exchanges. Where one or more these supporting institutions are either absent or costly, exchanges either do not take place or are very limited (North 1990; Nabil and Nugent 1989; Gabre-Madhin et al. 2003). However, any particular institution, narrowly defined, may not be indispensable for market development and growth, rather, very different institutional structures may reasonably substitute for each other, both in dissimilar as well as similar contexts (Engerman and Sokoloff 2003). The problem then is to identify the appropriate institutional form(s) for market development for a specific commodity in a given social, economic and political setting.

Livestock perform multiple functions in the Ethiopian economy by providing food, input for crop production and soil fertility management, raw material for industry, cash income, saving, fuel, social functions, and employment. Various estimates show that the livestock sub sector contributes 12-16 percent of the total and 30-35 percent of agricultural GDP, respectively. The sector's contribution to national output is underestimated because traction power and manure for fertilizer are not valued.

Contributing 12-15 percent of total exports earnings, the sub-sector is the second major source of foreign currency in Ethiopia through export of live animals, hides and skins (MEDaC 1998; FAO 1999). The sector also employs about one-third of the country's rural population. Therefore, livestock can serve as a vehicle for improving food security and better livelihood, and contribute significantly to agricultural and rural development. However, despite the large number of livestock in the country, its role in the overall economy remains less than its true potential. It is perceived that problems associated with both domestic and export markets for livestock are among the reasons for failing to exploit the potential of this sector.

Field studies in different parts of the country in the 1980s showed that livestock account for 37-87 percent of total farm cash income of farmers, indicating the importance of livestock for rural livelihoods, especially as one moves from mixed farming in the highlands to agropastoral systems on the highland-lowland margins (Gryseels 1988). However, despite the reasonably high share of cash income coming from livestock as a source of smallholders' livelihood, the production system is not adequately market-oriented. There is little strategic production of livestock for marketing except some sales targeted to traditional Ethiopian festivals. Although livestock is an essential component of smallholder mixed farm systems in the highlands, it is not yet a primary livelihood activity or a primary source of cash income for any significant number of communities or households. For example, a community survey in the Oromiya region showed that livestock ranked 3 on average out of the top five cash income sources in the sample communities, and it appeared as a secondary/tertiary livelihood activity or source of overall income for about 40 percent of the households in the region (Jabbar et al. 2002).

Therefore, increased commercialization of livestock production and improved access to market by livestock keepers are essential for exploiting the potential of the livestock sector in the development process.

The structure and performance of live animal markets, both for domestic consumption and for export, are generally perceived to be poor. Lack of market oriented production, lack of adequate information on livestock resources, inadequate permanent animal routes and other facilities like water and holding grounds, lack or non provision of transport, ineffective and inadequate infrastructural and institutional set-ups, prevalence of diseases, illegal trade, and inadequate market information are generally mentioned as some of the major reasons for the poor performance of the livestock markets (Hurissa and Eshetu 2002 ; Aklilu 2003). Past studies have generally described the structure of livestock marketing as consisting of four tiers or layers from producers to consumers (Kebede *et al*. 1988; Kebede and Lambourne 1985) and some studies have shown that price differences between layers could be explained by transport costs (Andargachew and Brokken,1993). But little is known about how the different layers actually function, how market actors at different layers gather and exchange information, interact, negotiate and effect transactions, settle disputes, how costly and effective the transactions are, how effectively consumer prices are transmitted to producers and who benefits how much from market transactions. Also what kind of organizational and institutional arrangements support or hinder these transactions are not well known. Yet such understanding is essential for designing policy and institutional support to facilitate market development for the benefit of producers, consumers and intermediaries alike because once trade linkages expand beyond the local level across space and time,

transactions costs related to monitoring and enforcement increase sharply, and the local social network or relationship needs to be replaced and complemented by formal organizations and institutions enforced by the state (North 1989).

A survey was conducted in the Ethiopian highland markets to understand recent changes in livestock market structure and performance and also trader behavior and transactions costs. The aims of this paper are to analyze the behavior of traders in live animal trading, the organizational and institutional arrangements that are in place to facilitate livestock market transactions, the nature and extent of transactions costs faced by traders and how they are related to physical marketing costs, and the implications of these for development of policy and institutional support for improving livestock market performance for the benefit of producers, traders and consumers.

DATA SOURCE

A sample of 38 livestock markets in the Tigray, Amhara and Oromiya highlands were surveyed in 2002. The selection of the markets was pre-determined by a previous survey conducted in 1998-2000 on policies for sustainable land management in these regions. In the land management study, a community survey was conducted on 85 and 49 Peasant Associations in the Oromiya and Amhara regions respectively and 50 Tabias in Tigray. These communities were selected using a multi-stage stratified sampling frame, where population density (high vs low), market access (high vs low) and agricultural potential (agroecological zone or access to irrigation) were used as stratifying criteria. In the present survey, food grain and livestock markets serving a subset of the previously surveyed communities were selected for market structure and trader behavior analyses.

From the 38 livestock markets, 131 traders were selected dividing almost equally between mainly or exclusively cattle traders and mainly or exclusively sheep and goat (henceforth referred to as shoat) traders. In the final sample, 63 (48 percent) were mainly or exclusively cattle traders and 68 (52 percent) were mainly or exclusively shoat traders.

Data were collected using structured questionnaires. The main subjects on which data were collected include demographic characteristics and nature of business of the traders; types of animals traded; physical and financial assets including credit; social capital and commercial relationships; nature and extent of contract violations in transactions; methods for dispute settlement and protection of property rights; pattern of transactions costs and margins and related reasons and perceived marketing problems.

Trader behavior and transactions costs may vary significantly according to the type of animal traded, the main market level (primary, secondary, terminal) operated, the region of operation and other factors. Analyses by animal type traded and region did not show many significant differences. Analysis by market level could not be satisfactorily done because of the difficulty of classifying the sample markets into different levels using available information. Therefore, overall general trends are presented here highlighting any significant deviation due to any specific factor.

RESULTS AND DISCUSSION

Some General Characteristics of the Traders and their Businesses

Demographics

Although the survey was conducted in markets in Tigray, Amhara and Oromiya regions, traders from one region might have been operating in another region, especially in markets close to the regional borders. Also ethnicity cut across regional borders in

some places and ethnic connection sometimes play some role in building market networks (more later) so ethnic rather than regional identity of the samples were recorded. Fifty seven percent of the sample traders are from Amhara ethnic group, 30 percent were Oromo, 11 percent were Tigrai and 2 percent were Gurage. Seventy one percent of the traders speak Amharic, the national language, 21 percent speak Oromifa and 8 percent speak Tigrina. Seventy seven percent of the traders are Orthodox Christians, 18 percent are Muslims and 5 percent are Protestants. Thus it appears that fewer Muslims are involved in animal trading in relation to their share in the highland population.

The sample traders are on average 36 years old: 38 and 35 years respectively for cattle and shoat traders, the difference being statistically significant at 10 percent level. The difference may also indicate that shoat traders graduate to cattle trading through experience.

The traders have an average of 5.8 years of schooling with no significant difference between cattle and shoat traders. The fathers of the traders had an average of 2.5 years of schooling with no significant difference between cattle and shoat traders. About 84 percent of cattle traders are married compared to 68 percent of shoat traders, another indication of the seniority of cattle traders.

Business type and origin

About 8 percent of cattle traders reported that they had started with shoat trading but only 2 percent of shoat traders reported that they had started with cattle trading. Also about 11-13 percent of the traders started to work as an agent or a broker for other traders before starting own trading business. They had an average of 4 years experience (5 and 3.3 years for cattle and shoat traders respectively) as broker or agent before taking up

trading business. This was a learning and training mechanism as there is no formal training opportunity for traders and none has received such training.

Because of lack of standardized products, inadequate market information and limited or no formal legal mechanisms for arranging and enforcing business contracts, brokers and buying/selling agents play critical roles in many developing countries and the intricacies of the business are learned while acting as agents and brokers. For example, in the Ethiopian grain marketing sector, brokers perform the following functions: providing market information to clients, arranging the handling and logistics of grain delivery, grading and classifying grain, determining its market price, and matching buyers and sellers. They also store unsold stocks for a fee (Gabre-Madhin 2001). Some of these functions arise because of the need to link distant buyers and sellers and the need to physically move grains. In the livestock market, physically present animals are traded and traders are also generally physically present to undertake the transactions. The role of agents and brokers are much more limited compared to the grain market in that they principally negotiate between the buyers and the sellers and also provide market information. Yet these limited functions allow agents and brokers to gain experience and graduate to own trading business.

All the traders said they started the business themselves. For most traders this was the first entry into any kind of business, especially animal trading. Traders have come from a variety of backgrounds: 36 percent of the traders said they had farming as the main occupation before starting animal trading, 9 percent said they were engaged in some other agricultural trade, 12 percent said they were in military service/army, 33 percent said they were students and another 10 percent had other occupations before taking up

animal trading. Most of the traders came from a non-trading family background, as the father of 75 percent of traders was a farmer, for 10 percent it was trading in agricultural commodities but rarely livestock, for 8 percent it was a service including in the army, and another 8 percent had other occupations.

About 8-11 percent of the traders, mostly among shoat traders, also operate as buying/selling agent or a broker for other traders, alongside their own business. Forty percent of the traders still have another occupation other than animal trading or acting as broker/agent of other animal traders. Among other occupations, 62 percent have farming, 6 percent are students, 4 percent are service holders/wage earners, 6 percent have some agricultural trade and 23 percent have various other occupations. Traders derive about 80 percent of total revenue earnings from trading activities. Out of the total trading revenue, about 90 percent is derived from animal trading. Both of these are indications that for most of the traders, animal trading is a major income generating activity.

All the traders except 2 shoat traders reported that they were running businesses under sole ownership; the other two were partnerships. About 65 percent of the traders said they started the business themselves with their own capital, 25 percent received financial assistance from other family members, 8 percent were supported by non-family members and 2 percent borrowed from a bank or an NGO to establish their business.

Physical and financial assets

Livestock markets are usually open yards without permanent houses or other residential structures. However, these markets are generally located on one side of a multi-purpose market, so some traders may maintain offices and stocking facilities either near the livestock market or somewhere within the market boundary. Usually such facilities are owned or rented at the base or principal market of operation from where

other markets are accessed. Fifty seven percent of the sample traders reported that they had a place (location/office/structure) for their exclusive use in the market where they were interviewed, 22 percent used their residence at or near the market for buying and selling. A few traders also have an office/structure in a second market.

Most traders assemble animals purchased from one or more markets at some place before taking them to another market for sale. Sixty nine percent of the traders said they have exclusive stocking facilities for such assembly (including 37 percent who use their residence compound as a storage yard) and 29 percent have access to shared or collective storage facility. Average holding capacity for such stocking facilities is 56 cattle or 165 shoats but traders who use house compounds as a stocking place can accommodate only 28 cattle or 57 shoats. Thus it appears that larger traders maintain separate stocking facilities. The average value of the shop and/or the stocking facility is about Birr 12000 (about $1490) for cattle traders and Birr 1250 ($140) for shoat traders.

Animals are not weighed in the market as prices are fixed by eyeball estimation and bargaining based on different criteria or indicators (see below), so virtually no trader owns any weighing scale. Animals are transported mainly on hoof except that recently, some traders have started directly transporting animals from some large markets to the terminal markets in the big cities. Therefore, transport vehicle ownership is also rare among livestock traders. Where animals are transported by vehicle, this service is generally hired from transport service providers, a different type of business altogether.

The average nominal values of the current working capital of both cattle and shoat traders are several times greater than when they had started business (Table 1). The real values could not be accurately calculated because of the lack of accurate information on

the exact year of start of business, which varied widely among the traders, and the lack of a proper deflator to be used to standardize prices or values. In general, cattle traders have about twice as much working capital as shoat traders. The values of current capital were 10-20 percent lower than the previous year values. The reason could be either under-reporting or real loss in the business (see below).

Table 1--Average working capital of cattle and shoat traders (Birr/trader)

	Current	One year ago	At start of business
Cattle traders	11023	13305	2936
Shoat traders	5490	6978	1267
All traders	8152	10026	2070

Source: Field survey 2002

Only 22 percent of cattle traders and 32 percent of shoat traders reported borrowing for their animal trading business at the time of the survey. Among the borrowers, 43 percent of cattle traders and 64 percent of shoat traders borrowed from friends and relatives and from informal sources; very few had access to formal banking or development agencies (Table 2). The bank charged 12 percent interest per annum, the micro-finance agency or NGOs charged 10 percent; most loans from friends and relatives were for short periods free of interest but some medium to long term private loans required 36-60 percent interest per annum.

BUSINESS OPERATIONS AND SOURCES OF INFORMATION

Market coverage and business concentration

An average trader has been in this business for about 10 years (Table 3). A trader operates in 1-7 purchase markets (average 3 markets) and 1- 4 sale markets (average 1.5 markets). Thirty eight percent of the traders operate in only 1-2 purchase markets while

63 percent operate in only one sale market. Cattle traders visit more purchase and sale markets than shoat traders. At the start of their businesses, they visited fewer purchase and sale markets than presently. This means that traders collect animals from a larger supply hinterland and smaller markets and sell in fewer larger markets, and with experience and perhaps with capital accumulation they expand their operational domains.

Table 2--Distribution of traders according to source and amount of borrowing at the time of the survey

Source	Cattle trader		Shoat traders	
	No	Birr/head	No	Birr/head
Bank	1	60000	-	-
Micro-finance agency	3	1933	3	3833
NGO	1	2000	1	1000
Friend/relatives	6	6500	14	1758
Other traders	-	-	1	200
Money lender	1	3000	1	3400
Saving society	-	-	1	2000
Others	2	10500	1	100
All sources	14	9343	22	1946
% of all traders borrowed	22		32	

Source: Field survey 2002

Table 3--Market coverage and business concentration of traders

	Cattle traders	Shoat traders	All traders
Age of business (years)	10.5	10.6	10.5
N of markets visit for purchase	3.6*	2.5	3.0
N of markets visit for sales	1.6*	1.3	1.5
N of purchase markets visited at start	2.4*	1.7	2.0
N of sales markets visited at start	1.3*	1.1	1.2
% of total purchase in the main purchase market	55.2	61.1	58.2
% of total sales in the main sales market	88.1	87.0	87.6

* Significantly different at <0.05 level.
Source: Field survey 2002

Traders' business concentration can be judged by the concentration or dispersion of the location of their purchases and sales. Traders conduct about 58 percent of their total purchases in one main market and the remainder is distributed to other purchase markets, and they conduct 88 percent of total sales in one main market. This indicates that though there is no formal barrier to enter any market for any livestock trader, most traders operate in known local markets or market routes about which they have good knowledge, and may not generally venture into unknown territory. Whether traders formally or informally discuss and decide who will operate in which market is not known. Ethnic and cultural differences sometimes may act as indirect or direct barriers to enter certain markets. For example, cross-border trading of livestock is very common in the Ethiopia-Somalia and Ethiopia-Kenya borders and Somali and Borana ethnic communities respectively are mainly involved in this trade, implying that entry barrier to outsiders may be very high (Tegegne et al. 1999).

About 80 percent of the traders run the business alone; the remaining 20 percent engage family members (father, brother, son etc) or non-family relatives or wage employees to run the business. These traders have employed an average of 1.4 other persons in the past year.

Traders spend an average 4 days per week for animal trading activities. About 90 percent of the traders occasionally remain absent from the business premises or the market of operation. On such occasion, 80 percent of the businesses remain non-functional while 20 percent of the businesses are operated in absence of the owner with purchase and sales decisions taken by others involved in the business. This means that most businesses are highly personal in nature, and transactions are effected in physical

presence of the parties. Absence from the premises or the market does not allow continuation of the business and also in the absence of forward purchases and sales involving deliveries at pre-determined times and places, the trader has no prior obligation to remain present in any market.

If a trader can't sell all his animals on a market day at prices initially asked, 39 percent sell at reduced price, 43 percent return the next market day, 5 percent take the animals back for reconditioning to add value.

Social capital and commercial relationships

Livestock traders do not seem to be organized into any formal groups or associations that may play a role in the marketing process by providing various services and in price formation. Although there is a Livestock and Meat Exporters' Association and a National Tanners' Association in the country, traders operating in the domestic livestock markets are not eligible for membership in these associations (Aklilu 2003). Only one of the sample traders reported being a member of a formal association and only 25 percent have a bank account. Thirty eight percent are members of informal credit societies called Ekub, where individual members contribute per week or per month and one member wins a lot every time a lottery is held, thus giving each member an equal chance of winning over time.

Where products exchanged in the market are not standardized, when there is no formal mechanism for contract enforcement and dispute settlement, when various kinds of market information (price, supply, demand) are not easily and readily available in the public domain, market operators develop alternative means or institutions to facilitate transactions. Under such circumstances social capital may play a critical role in facilitating market exchange. Social capital is broadly defined as a 'stock' of trust

resulting from close functional or emotional attachment to a group or society that facilitates the provision of public goods (Fukuyama 1995; Greif 1993). For example, for traders of a particular commodity, social capital may be measured by the extent of the network of trading contacts available to each trader. Such networks may facilitate exchange between partners, reduce transactions costs of searching for potential partners, and also get access to market information.

In the sample markets, an average trader knows about 35 other traders in purchase markets in which they operate and 25 other traders in the sale markets where they operate compared to 13 and 9 traders when they had started business. Thus it appears that traders increase their social network along with experience.

Unlike the grain trading business, long distance trading through buying and selling agents is virtually nonexistent in livestock trading. Transactions are effected mainly through personal negotiations; only 28 percent of the traders occasionally employed brokers to negotiate transactions. In the 12 months preceding the survey, 8-21 percent of traders in different markets used brokers in purchase and sale markets and they conducted 44-51 percent of purchases and 48-60 percent of sales through brokers. Of these brokers, 37 percent are from the same ethnic group and 49 percent are from the same religion as the traders themselves; 19 percent met socially outside business network and only 6 percent are close relatives. Only 9 percent of the traders said that some brokers work exclusively for certain traders. These are indications that the traders operate through a network of trusted intermediaries with whom they have business relationships without strong ethnic, religious or family ties. Brokers who worked exclusively for some traders have worked for an average of 3.9 years under such arrangements.

About 50 percent of the brokers are paid on a per animal basis; the rate is determined through informal discussions between traders and brokers in a given market. Thirty percent of the traders pay using their own discretion based on the history of business relationship, volume of business handled, etc. About 14 percent of traders pay a lump sum for a market day also based on volume of business handled and history of business relationship.

Beyond the farmer's gate or the primary local market, most of the transactions take place between traders – local small traders selling to larger distant traders. Traders often deal with regular suppliers and customers principally based on trust. Among the sample traders, 28 percent have regular suppliers and 40 percent have regular customers, and 40-45 percent of the transactions are conducted through regulars, with most of whom there are exclusive trading relations. About 50 percent of the regular suppliers and customers are from different ethnic and religious groups than those of the traders and very few are close relatives indicating that these relationships are based on business trust rather than social or family relationships.

Although cash transaction are the norm, 54 percent of the traders said they engage in credit sale and 46 percent of the traders said the same customers could buy on credit from other suppliers. However, credit purchase or advance payment by traders is rare especially in transactions between farmers and traders. Among those who deal in credit sale, 20 percent said they charge a higher price for a credit sale. Such price differences were not, however, statistically significant.

Sources of information

Information on supply, demand and prices are essential ingredients in any trading business as decisions on transactions and prices are made on the basis of this information,

and money is made or lost based on the degree of accuracy of these information. Therefore, traders are likely to spend a lot of effort and time in searching for information and they are likely to use a combination of different sources or means to collect these information. The sample traders were asked about the sources of their information for prices, supply and demand conditions in local and distant markets. Most of the traders collect price information for the local market and nearby markets through personal observation and about a quarter set own price for export/import market (Table 4). Each trader follows, on average, 1.5 types of animals, 2.5 supply markets (2.7 by cattle traders and 2.2 by shoat traders), and 1.3 sales markets. Each trader consults an average of 5 people per market day in the main market and 4.2 people in other markets for different information. Each trader also engages 2.8 people (3.3 by cattle traders and 2.4 by shoat traders) for collection of price information.

Formal sources of information, e.g. television, radio and newspapers, are used by very few traders except that the use of radio and TV is slightly important for acquiring price information for the export/import market. Use of telephone is rare. About 10 percent of traders use regular suppliers, customers, or other traders for price information for the local market, and about 20 percent use these sources for other nearby markets, indicating that as distance increases, dependence on trading network for price information also increases. About 79 percent of the traders (75 percent of cattle traders and 84 percent of shoat traders) do not get precise price information from outside markets. A majority of the traders do not get any information about price in the export/import market.

Table 4--Sources of price information for cattle and shoat traders in local and distant markets (% traders)

	Price in local market	Price in other markets	Price in export/import market
Personal observation	84.7	57.3	-
Sets own price	-	-	24.4
Speaking with regular suppliers or customers	6.9	9.2	-
Other traders	5.3	11.5	3.8
Newspaper	-	6.9	0.8
Radio/Television	-	0.8	16.0
Others	3.1	0.8	0.8
Don't get any information	-	13.0	54.2
All sources	100.0	100.0	100.0

Source: Field survey 2002

In this general pattern, there are some minor differences between sources of information for cattle and shoat traders. A significantly higher proportion of cattle traders than shoat traders depend on personal observation for price information for nearby markets, and a significantly higher proportion of shoat traders than cattle traders do not get any price information for such markets. The difference between the sources of price information for cattle and shoat traders for the export/import market is statistically significant different (at a level of 0.08). A higher proportion of cattle traders use television/radio while a higher proportion of shoat traders set own price.

The vast majority of traders depend on their own observation or estimate for information on supply and demand in the local market but the importance of personal observation is much smaller in other nearby markets or for the national level (Table 5). The use of a trading network of regular suppliers and customers and other traders is more important for other markets than for local markets or for national level supply/demand assessment. The use of television/radio is slightly important for national level

demand/supply estimation for cattle. The proportion of traders reporting no access to information increases as one moves from local to national level.

Livestock traders are vaguely aware of government regulations about taxes on transactions but are not very clear about other regulations that directly or indirectly affect livestock marketing. Information on changes in policies and regulations are obtained from other traders by 6.9 percent of traders, from newspapers by 3.1 percent, radio/television by 21.4 percent, and concerned government offices 10.7 percent. About 27.5 percent (35 percent among shoat traders) make their own interpretation about rules and 29.8 percent have no knowledge about these regulations.

Table 5--Sources of information for traders on demand and supply conditions (% traders)

	Local market		Other markets		National level	
	Cattle	Shoat	Cattle	Shoat	Cattle	Shoat
Own observation/estimate	81.0	75.0	25.9	10.3	17.4	28.0
Regular customers/suppliers	3.2	-	1.6	1.5		
Other traders	6.3	10.3	22.2	8.8	14.3	4.4
Intermediaries	1.6	-	-	1.5	1.6	1.5
Newspaper	3.2	-	-	1.5	3.2	-
Radio/television	-	-	6.3	2.9	15.9	2.9
Don't get any information	4.8	14.7	47.6	73.5	47.6	63.2
All sources	100.0	100.0	100.0	100.0	100.0	100.0

For local market, chi square for difference between cattle and shoat significant at 9.4%
For other market, chi square significant at 6.8%
For national level, chi square significant at 1.3%
Source: Field survey 2002

Product type and quality

The quality of a product reflected in grades, standards and other differentiating criteria is a key factor that influences both the price of the product and the behavior of traders. In the Ethiopian livestock markets, there are no officially defined grades or standards for either cattle or shoats. However, different breeds of cattle and shoats are

raised in the country and previous studies have shown that animals of different age, sex and body condition are traded in the market. Therefore, assuming that some of these criteria could be used by market agents to determine quality, sample traders were asked if they trade in different breeds of animals. Forty three percent of cattle traders and 19 percent of shoat traders said yes (average 31 percent, significant at <1 percent). Among those saying yes, all cattle traders and 85 percent of shoat traders (average 95 percent) said they ascertained breed by physical inspection, while 15 percent of the shoat traders depend on supplier information as it is more difficult to identify shoat breeds.

Asked what breeds they frequently trade, the following were mentioned: *yeferang*[a7], dry cow, adult male/ram, adult female/ewe, young, goat, sheep, *adal* sheep. It seems the traders do not really have a proper concept of breed, perhaps they referred to type of animal traded rather than breed.

The confusion became apparent when the sample traders were asked if for each breed they traded, there were different qualities. Forty five percent of cattle traders and 18 percent of shoat traders (average 30 percent) said yes. Among those who said yes, nearly all said they ascertained quality by physical inspection. Asked to specify the qualities they normally used in differentiating animals the following were mentioned:

[7] This term is generally used to refer to exotic or crossbred or foreign animal. However, the term is also apparently used to refer to animals fattened in small feedlots for urban markets or for export oriented meat processors.

Quality description	Cattle	Shoat
Adal	x	
Dega	x	
Good quality	x	x
Tuka	x	
Yabes a	x	x
Yeferang	x	

It is unclear if some of the quality descriptions are in fact local breed names or a composite local description of a particular quality of an animal or animal type.

The discrepancies in information about breed and quality descriptions within breeds might have resulted either from a genuine lack of knowledge or understanding of these terms among the traders, or from enumerators' inability to describe these terms to the traders during the interviews, leading to reporting errors by traders.

Contract violations

Transactions in livestock markets are generally based on verbal agreements based on terms negotiated verbally between the parties involved. There is no system of written documentation of the transaction and its terms. The receipt for market tax is the only recorded document of a transaction in which few details other than the animal type and the agreed value of transaction are recorded. Although contract terms including price are determined in physical presence of the parties, lack of any written instrument increases the probability of contract violations, especially in case of transactions on credit.

The sample traders experienced an average of 23 contract violations per trader in the 12 months preceding the survey. From 20-57 percent of the traders experienced contract violations of one form or another including delivery of poorer quality than originally agreed, attempt to renegotiate price, attempt by sellers to steal purchased

animals, delivery received after agreed date or received partial or no delivery, payment received after agreed date or received no or partial payment (Table 6).

There are some natural deterrents to such contract violations as it is generally believed that given the open social network, any supply or payment default will be soon known by other traders, which will affect the reputation of the concerned trader or customer. Seventy eight percent of the traders thought that if a trader does not pay a supplier others will quickly know, and 70 percent of the traders said if a customer does not pay other traders will quickly know.

Eighty percent of the contract violations are resolved through personal negotiations, a small percentage remains unresolved but formal courts or other formal organizations apparently have practically no role in the mitigation of disputes (Table 6).

Table 6--Proportion of traders experiencing different forms of contract violations in 12 months preceding the survey

Average number of disputes experienced per trader in 12 months	
-with suppliers	23.3
-with customers	23.9
% traders experienced contract violations	
- supplier attempted to renegotiate price	57
- supplier delivered poor quality	30
- supplier had animals stolen	20
- supplier delivered after agreed date	33
- supplier made partial delivery	33
- supplier did not deliver	3
- customer paid after agreed date	43
- customer made partial payment	41
- customer did not pay	37
% disputes with suppliers settled through	
- personal negotiation	80.4
- friends and peers	2.9
- community/elders	3.2
- others including formal courts	<1
- no resolution	11.6
% disputes with customers settled thru	
- personal negotiation	80.6
- friends and peers	8.9
- community/elders	1.5
- others including formal courts	<1
- no resolution	6.4

Source: Field survey 2003

Protection of property rights

Marketing essentially involves transfer of property rights between two parties. When the transaction takes place at a market place, there should appropriate formal and informal arrangements to create an environment at the market to facilitate negotiation and transfer of property rights and to protect the property right once the transfer is effected until a new transfer takes place with a new party. The new transfer may be preceded by spatial movement of the animal, e.g. from one market to another. Animals may be moved

on hoof or by some kind of vehicle. Protection of property rights during such movements is also necessary for cost effective and efficient marketing operations.

A major problem facing traders in the Ethiopian highlands in terms of protection of property rights is the possibility of theft of animals either from stocking yard or en route to market while trekking. Forty percent of the sample traders suffered from theft of animals during the 12 months preceding the survey and they lost an average of Birr 1345 ($157) per cattle trader and Birr 523 ($61) per shoat trader. In a few cases of theft, own employees of the trader were involved while in a few other cases, the involvement of the employees was suspected but not clearly established.

In order to protect animals from theft, stocked animals are usually kept under lock and key if the stock yard has good fencing, often guarded by a paid guard or the owner sometimes sleeps on the premises. When animals are trekked and nights are spent on the way, usually the animals are kept near a reputable person's premises as this gives some sense of security. Also some traders travel in a convoy that gives mutual support and security; some employ a paid guard individually or in a group but others avoid hiring such guard for fear of theft by the guard.

TRANSACTIONS COSTS AND MARGINS

Any exchange involves two sets of costs: physical marketing costs such as those for transport and storage, and transactions costs that arise from the coordination of the exchange among relevant market agents. The latter include the costs of obtaining and processing market information, negotiating contracts, monitoring agents and enforcing contracts (North 1989; Hoff and Stiglitz 1990; Williamson 1985; Gabre-Madhin 2001). Transactions costs are unique and specific to an individual market agent, so each agent in

the market conducts transactions on the basis of his/her own transactions costs. For example, a trader with greater search efficiency than another-- e.g. finding price information and a buyer at less time than another trader--will incur less transactions costs, so will be better able to compete in the market. When transactions costs are very high, market become thin or even fail (Gabre-Madhin 2001).

In order to understand the marketing and transactions costs of livestock trading business, information was collected from each trader about his/her most recent completed purchase and sale transactions. In the previous 12 months, 45.9 percent of the traders were involved in cattle trading (39.3 percent traded[8], 2.3 percent milk cow , 2.3 percent heifer, and 2 percent dry cow), and 54.1 percent were involved in shoat trading (35 percent traded adult male sheep/ram, 10.5 percent adult female sheep, 4.6 percent kids and 4 percent young sheep).

For purposes of estimating marketing and transactions costs, *yeferang* trading was separated from other cattle trading because of the major difference in the type of animals and prices involved. During the most recently completed transactions, cattle and *yeferang* traders traded 6-8 animals and shoat traders traded 17-20 animals on average (Table 7). Shoat and *yeferang* traders traveled a shorter distance for these transactions than cattle traders. Compared to cattle traders, shoat and *yeferang* traders devoted twice and thrice as many days respectively to conduct the purchases. In general, each type of trader purchased from a slightly larger number of people than they sold to.

Cattle traders earned 4.4 percent gross margin on purchase price of these transactions, *yeferang* traders lost 35 percent on purchase price and shoat traders lost 13

[8] These are mainly fattened animals and few are crossbred animals.

percent on average (Table 7). When only those traders who used brokers/agents for purchase and/or sale were considered, cattle traders' gain increased to 7.5 percent while *yeferang* and shoat traders' losses increased to 45 percent and 22 percent respectively. This means that cattle traders either reduced some aspects of transactions cost, e.g. search costs, or negotiated a better price by employing brokers/agents. Cattle traders who used a broker/agent incurred cost on broker use, bought and sold at higher than overall average prices yet had higher rates of return because the price difference more than compensated the extra cost of broker use. *Yeferang* and shoat traders paid higher than average prices for purchases, incurred higher cost due to broker use but sold at lower than overall average prices, hence their losses increased.

Table 7--Pattern of animal transactions, their costs and margins

	Yeferang trade	Other cattle Trade	Shoat trade
Average no of traders involved	19	38	74
Average n of animals purchased	7	8	20
Average n of animals sold	6	6	17
Average distance between markets covered, km	76	96	69
Average n of days to purchase	7.6	2.7	5.1
Average n of people from whom purchased	5.6	6.8	13.7
Average n of people to whom sold	4.4	4.7	12.7
Cost and return per animal (Birr)			
Purchase price	650	520	101
Variable cost	126	54	15
Total cost	776	574	116
Sale price	546	597	111
% gain or loss on purchase price	-35.3	4.4	-5.4

Source: Field survey 2002

The structure of variable costs shows market levies, transport, travel, payment at road stops (rent seeking by security check point operators), and feeds are major items for cattle and shoat traders but only feed and stocking cost covered 80 percent of cost for *yeferang*

traders (Table 8). The opportunity cost of labor spent on traveling to markets for buying and selling, searching partners and negotiating contracts, and trekking animals are all included in travel and transport cost estimates. Since most transactions were done in physical presence of the contracting parties, most of the costs were direct physical marketing costs; transactions costs (search costs, contract negotiations and enforcement costs) were small as the transfer of property rights involved simple procedures.

Table 8--Distribution (%) of variable cost of case transactions

	Yeferang trade	Other cattle trade	Shoats trade
Feed and water	76.7	14.0	30.0
Stocking cost	3.3	1.5	1.1
Levies at purchase market	1.3	23.0	16.1
Levies at sale market	2.0	8.5	5.9
Transport	5.7	21.6	11.9
Payment at road stops	0.01	10.4	0.1
Travel cost	7.7	10.9	20.5
Agent cost at purchase/sale market	0.01	5.8	1.1
Other costs	2.5	4.0	13.1
All costs	100.0	100.0	100.0

Source: Field survey 2002

To calculate profit, among other items the cost of holding stock while searching for a buyer needs to be calculated. This can be done by taking the opportunity cost of own capital or non-interest paying loan and actual cost of capital raised through interest paying credit. Since *yeferang* and shoat traders earned negative gross margins and cattle traders earned a very small gross margin, adding capital cost for the search period of holding stock would further reduce the gain or further increase the losses as the case may be.

The apparent low returns to the case transactions could be representative and real but they might also be due to several other reasons; e.g. there could be reporting errors (over reporting of costs and under reporting of prices), the traders might have chosen the cases for reporting those transactions where they knew they had low margins, or these transactions took place at times when the market in general was low. More such case studies from a wider area might provide more clear answers.

MAJOR MARKETING PROBLEMS

Sample traders were asked to mention three marketing problems, in descending order of importance, for cattle and shoat marketing. The results are summarized in Table 9.

Table 9--Major marketing problems as perceived by traders

Major problem	Cattle traders			Shoat traders		
	1st rank	2nd rank	3rd rank	1st rank	2nd rank	3rd rank
Multiple taxes	26.8	4.5	6.9	9.5	8.3	6.0
Unstable price	16.9	16.7	12.1	21.6	22.2	1.5
Non-transparent tax system	12.7	9.1	10.3	6.8	11.1	10.4
Limited access to credit	7.0	13.6	5.2	5.4	11.1	7.5
Weak demand for types of animals traded	8.5	13.6	12.1	12.2	5.6	19.4
Low/high price	1.4	3.0	1.7	4.1	6.9	4.5
Inadequate market information	-	3.0	12.1	-	-	9.6
Inadequate market infrastructure	2.8	-	-	2.7	-	9.0
Un-licensed traders	2.8	1.5	3.4	1.4	1.4	1.5
Absence of govt support	-	1.5	1.7	1.4	4.2	3.0
Weak legal system	-	1.5	6.9	-	-	4.5
Poor quality products	-	4.5	-	-	1.4	1.5
Others	21.1	27.3	24.1	35.1	26.4	20.9

Source: Field survey 2002

Multiple taxes, unstable price and non-transparent tax system are the three main first rank problems mentioned by cattle traders while unstable price, weak demand for the type of animal traded and multiple taxes were three main first rank problems mentioned

by shoat traders. Limited access to credit was mentioned as a second rank problem by a good proportion of both cattle and shoat traders. Combining all the ranks, unstable price (46 percent of cattle traders and 45 percent of shoat traders), multiple taxes (38 percent and 24 percent), weak demand for the type of animal traded (34 percent and 37 percent), non-transparent taxation system (32 percent and 28 percent) and limited access to credit (26 percent and 24 percent) appeared to be the main problems. Only 6 percent of cattle traders and 15 percent of shoat traders mentioned low/high price as a major problem. Several issues that are amenable to public policy--e.g. inadequate market information, inadequate market infrastructure, inadequate government support, existence of unlicensed traders and weak legal system--were mentioned as problems by very few traders. Although a high proportion of traders mentioned that they do not get any price information from anywhere to aid their business decisions, few apparently considered this as a major marketing problem, perhaps because most transactions are conducted through physical presence with information collected through personal observation.

Traders consider unstable price as a more serious problem than low/high price as such. Prices depend mainly on supply and demand, which is heavily influenced by the season of the year and the occurrence of religious and cultural festivals on the one hand and occurrence of drought or other weather shocks on the other. For example, northern Ethiopia's livestock supply is heavily influenced by the severity of the dry season; supply peaks after the October-January rainy season then drops rapidly. In the South, low sales volume characterize the July-September main rainy season, and the Lent fasting period (February-April), but trade peaks immediately following these periods (Tilahun 1983).

The volume of sales and prices generally increase before major festivals (Andargachew and Brokken 1993; Ehui et al. 2000; Ayele et al. 2003).

Yearly price variation may also be triggered by general crop sector performance and weather patterns. It is often argued that in mixed farming systems livestock may serve as a hedge against risk of crop failure as livestock can be sold to derive cash in the absence of crop output and income. However, crop sector performance may act as a double-edged sword for livestock. A bumper crop harvest may reduce crop price in the absence of market stabilization mechanisms, hence reduce people's real demand for livestock and paradoxically a crop failure may also have the same effect. For example, bumper harvest in 2001-2002 led to a serious fall in grain prices in Nazereth market, often considered as the terminal market in central highlands, so many farmers decided to sell livestock to settle fertilizer debts and meet other urgent needs rather than selling grain at harvest time low price. But livestock prices soon fell due to over supply. Then there was a drought in the following season resulting in substantial crop failure, a major rise in crop price but a fall in livestock price as most people had to sell livestock to generate cash while buyers did not have much cash to buy animals (Jabbar and Ayele 2003).

In spite of these seasonal and yearly price variations, the price of meat in the Addis Ababa market remained unchanged for the last five years. This may be an indication of the market power of butchers who are close to consumers and as a group control meat price (Aklilu 2003). In a situation of unstable price, how far consumer prices are transmitted to the producers and how much of the gains are captured by the butchers and other intermediaries are not clear.

SUMMARY AND CONCLUSIONS

Livestock perform multiple functions in the Ethiopian economy yet the production system, especially the mixed farming system in the highlands, is not adequately market oriented. Commercialization and market expansion are therefore essential for exploiting the potential the livestock sector. This will require understanding of how different layers of the livestock market function; how market actors in different layers gather and exchange information, interact, negotiate and effect transactions, and settle disputes; how costly and effective the transactions are, how effectively consumer prices are transmitted to producers; who benefits how much from market transactions; and what kind of organizational and institutional arrangements support or hinder these transactions. Such knowledge is expected to help design policy and institutional support to facilitate market development.

Traders perform a key role linking producers and consumers in the Ethiopian livestock markets. Knowledge about their trading behavior and transactions costs could provide guidance on how policy and institutional support could be designed to improve livestock market performance, so a survey of 131 livestock traders in 38 markets in the highlands of Ethiopia was conducted in 2002.

The results show that the traders are generally young and shoat traders are younger than cattle traders. They come from varied occupational backgrounds with only a few having a family background in trading. Most traders started business themselves with their own capital. Access to credit, especially formal credit, has been very limited. The livestock market is characterized by non-standardized products and lack of information in the public domain about supply, demand and prices. Consequently, livestock trading is largely a personalized business, though intermediaries, especially

brokers, are used for trading in distant markets. Traders also use a network of intermediaries, a form of social capital, with whom they have business relationships principally based on trust and without strong ethnic, religious or family ties. Being a personalized business, personal observation through physical presence is used as the dominant mechanism to gather information on price, supply and demand. Also absence of such information in the public domain means other indirect sources, especially social networks and peers are also used. Formal sources such as radio, television and newspapers are used by a few for national level and export/import market related information.

Even though most transactions are conducted in physical presence of parties, contract violations are common, especially in case of transactions on credit. Most of these violations are resolved through personal and informal negations as formal courts or other formal organizations are not easily accessible for quick resolution of disputes. Theft of animals either from stocking yards or en route to market is a major problem of and traders adopt various non-conventional means to avoid this problem.

Estimated costs and margins of case transactions show low returns and losses on investment in some cases. Analysis of the structure of variable costs show that most are physical marketing costs; transactions costs are smaller as most exchanges are conducted in physical presence of the parties.

Unstable price, multiple taxes, non-transparent tax system, limited access to credit and weak demand for the products traded are perceived as major problems of marketing. All the problems are amenable to public policy for improving the market environment and marketing efficiency. Alleviating these constraints along with improving market

information, and upgrading marketing infrastructures will potentially increase the welfare of smallholder producers and urban consumers. Rationalizing taxes will improve traders' income and that will allow them to offer better prices to producers. Also the more traders are aware of market demand and price, the higher will be their ability to transmit information to producers to improve production, both in terms of quantity and quality, thereby benefiting consumers.

Price instability is a major problem of the crop sector that has implications for food security, poverty alleviation, agricultural growth and overall performance of the economy. Given strong linkages between crop and livestock production and marketing decisions, the issue of price stabilization needs be addressed simultaneously for both crop and livestock sub-sectors.

REFERENCES

Aklilu, Y. 2003. An audit of the livestock marketing status in Kenya, Ethiopia and Sudan – issues and proposed measures. Nairobi, Kenya: African Union/Interafrican Bureau of Animal Resources.

Andargachew, K. and R.F. Brokken. 1993. Intra-annual sheep price patterns and factors underlying price variations in the central highlands of Ethiopia. *Agricultural Economics* 8:125-138.

Ayele, S., W. Assegid, M.A. Jabbar, M.M. Ahmed, and B. Hurissa. 2003. Livestock marketing in Ethiopia: a review of structure, performance and development initiatives. Socio-economics and Policy Research Working Paper 52. Nairobi, Kenya: International Livestock Research Institute (ILRI).

Ehui, S., S. Benin, and N. Gebreselassie. 2000. Factors affecting urban demand for sheep: The case of Addis Ababa, Ethiopia. Socio-economics and Policy Research Working Paper 31. Nairobi, Kenya: ILRI.

Engerman, S L and K.L. Sokoloff. 2003. Institutional and non-institutional explanations of economic differences. Working paper no 9989. Cambridge, MA: National Bureau of Economic Research.

FAO. 1999. FAOSTAT 1999-http://apps.fao.org/cgi-bin/nph.db.pl.

Fukuyama, F. 1995. Social capital and the global economy. *Foreign Affairs* 74(5):89-103.

Gabre-Madhin, E. 2001. Market institutions, transaction costs, and social capital in the Ethiopian grain market. Research Report 124. Washington, DC: International Food Policy Research Institute.

Gabre-Madhin, E., A. Gezahegn, A. Wolday. 2003. Markets and agri-food chains in Ethiopia's agricultural transformation: conceptual foundations. Paper presented at the workshop on 'Towards sustainable food security in Ethiopia: integrating the agri-food chain', organized by the Ethiopian Development Research Institute and the International Food Policy Research Institute, at the Ghion Hotel, Addis Ababa, Ethiopia, 15-16 May 2003.

Greif, A. 1989. Reputation and coalitions in medieval trade: Evidence on the Maghribi traders. *Journal of Economic History* 49 (4): 857-882.

Gryseels G. 1988. The role of livestock in the generation of smallholder farm income in two vertisol areas of the central Ethiopian Highlands. In *Management of vertisols in Sub-Saharan Africa,* ed. Jutji S.C., I. Haque, J. McIntire, and J.E.S. Stares. Proc. of a conference held at ILCA, Addis Ababa, 31 August-4 September 1987, Ethiopia.

Hoff, K. and J. Stiglitz. 1990. Introduction: Imperfect information and rural credit markets – puzzles and policy perspectives. *World Bank Economic Review* 4(3): 235-250.

Hurissa, B. and G. Eshetu. 2002. Challenges and opportunities of livestock trade in Ethiopia. Paper presented at the 10th Annual Conference of Ethiopian Society of Animal Production (ESAP), August 22 – 24, 2002, Addis Ababa, Ethiopia.

Jabbar, M A and A. Gezahegn. 2003. Livestock marketing, food security and related issues in Ethiopia. Paper presented at the workshop on Towards sustainable food security in Ethiopia: integrating the agri-food chain, organized by the Ethiopian Development Research Institute and the International Food Policy Research Institute, at the Ghion Hotel, Addis Ababa, Ethiopia, May 15-16, 2003.

Jabbar, M A, M.M. Ahmed, S. Benin, B. Gebremedhin and S. Ehui. 2002. Livestock, livelihood and land management in the highlands of Ethiopia. Paper presented at the conference on 'Sustainable land management policies in the East African highlands', United Nations Economic Commission for Africa, Addis Ababa, Ethiopia, April 24-26.

Kebede, Bayene and Lambourne, L. J. (eds.). 1985. The status of livestock, pasture and forage research and development in Ethiopia. Proceedings of a workshop held in IAR, Addis Ababa, Ethiopia, January 8-10 1985. Institute of Agricultural Research, Addis Ababa, Ethiopia.

Kebede, Z., G. M. Sintayehu, J. L. Airey, I. Paul, and M.A. Schildkamp. 1988. The livestock marketing information service: Its structure, method, goals, and the possibilities it offers the end users. Proceedings of the Second National Livestock Improvement Conference, IAR, Addis Ababa, February 24-26, 1988.

MEDaC (Ministry of Economic Development and Cooperation). 1998. Survey of livestock and fisheries development. MEDaC Agricultural Development Department, Livestock Team, Addis Ababa, Ethiopia. 65pp.

Nabil, M K. and Jeffrey, Nugent. (1989) The new institutional economics and its applicability to development. *World Development* 17(9): 1333-1348.

North, D. C. (1989) Institutions and economic growth – An historical introduction. *World Development* 179(9):1319-1332.

North, D C. 1990. *Institutions, institutional change and economic performance*. Cambridge University Press, Cambridge, UK.

Teka, T. Azeze, and A. Gebremariam. 1999. Cross-border livestock trade and food security in the Southern and Southeastern Ethiopia borderlands. Organization for Social Science Research in Eastern and Southern Africa (OSSREA) Development Research Report Series no. 1, Addis Ababa.

Tilahun, Negussie. 1983. Livestock marketing in North-Eastern Ethiopia. Research Report no. 8. Addis Ababa, Ethiopia: Joint ILCA/RDP Ethiopian Pastoral Systems Study Programme.

Williamson, O. 1985.*The economic institutions of capitalism*. Free Press, New York.

DISCUSSION

Q: What are the issues that need support from the government? (ii) What is the impact of animal diseases on livestock marketing?

A: Traders pay taxes but the services they get in the markets are not adequate so this needs to be improved. Some have also stated that lack of information is a problem. (ii) Although data on animal diseases was collected, when ranked among other factors, it was not significant in affecting livestock marketing.

SESSION V: SYNTHESIS OF LESSONS FROM STUDIES AND PANEL PRESENTATIONS AND DISCUSSION

LESSONS LEARNED AND IMPLICATIONS

John Pender

PANEL PRESENTATIONS

Ato Yibrah Hagos, Relief Society of Tigray (REST)
Ato Asmamaw Maru, Amhara Regional Government

LESSONS LEARNED AND IMPLICATIONS

John Pender

LAND MANAGEMENT IN EASTERN TIGRAY

- Short rainy season → sowing date critical
- SWC investments reduce risk, but may reduce yield compared to optimum sowing date
- Crop yields moisture or nutrient limited?
- Large negative nutrient balances, worse for N and K, wealthier farmers
- Burning of dung, poor management of manure, feeding of crop residues contribute substantially to nutrient depletion
- Tree planting, improved manure and compost management, fodder production can help reduce nutrient depletion on cropland
- Fertilizer unprofitable and risky in this environment without substantially lower price
- Fertilizer credit of limited benefit
- Off-farm employment very important for incomes, but doesn't help stop soil degradation
- Lower population density would lead to higher incomes, but not stop soil degradation
- Water harvesting can make fertilizer use profitable, stop nutrient mining, increase incomes

GRAIN MARKETS IN THE HIGHLANDS

- Grain markets are spatially integrated and competitive but not efficient
- Inefficiency includes “too much trade” as well as “too little”, varies by crop, little affected by 1999 change in role of EGTE
- Many weaknesses in grain markets:
    - Poor infrastructure, transport, communications
    - Lack grades and standards
    - Lack of market information
    - Lack of finance
    - Unlicensed traders – a problem?
    - Weak legal system, contract enforcement
    - Food aid dependence
- Main problems cited by traders:
    - Price instability
    - Non-enforcement of licensing requirements
    - High, multiple taxes and levies
    - Low demand, prices
    - Lack of credit
- Marketing costs mostly for sacking, handling, intermediaries and transport; taxes, “road payments”, storage, other costs are much less

- Traders have limited assets and earn small and often negative returns; high variance in their returns
- Returns higher for traders with more financial, physical, human and social capital

LIVESTOCK MARKETS IN THE HIGHLANDS

- Many similar problems in livestock markets as in grain markets:
    - Lack of infrastructure, transport
    - Lack of market information
    - Lack of credit
    - Strong seasonality in demand, unstable prices
    - Multiple, nontransparent taxes
    - Insecurity and theft
    - Unclear licensing requirements
    - Weak legal system, contract enforcement
    - No trade associations
- Main problems cited by traders:
    - Taxes
    - Unstable prices
    - Lack of credit
- Traders are generally young, poor, with little working capital, little access to formal credit, business highly personalized, low and negative returns common
- Major marketing costs are physical costs (feeding, water, transportation and travel costs); taxes, levies and “roadside payments” in some locations

IMPLICATIONS

- Promotion of integrated soil water and nutrient management in less-favorable environments such as eastern Tigray needed, including
    - SWC investments
    - Water harvesting/irrigation where feasible
    - Tree planting and fodder production in degraded areas to facilitate nutrient recycling
    - Improved management of manure and compost
    - Targeted use of fertilizer where profitable
    - Promotion of off-farm employment, voluntary resettlement can help improve incomes
- A broad range of investments and policies needed to improve grain and livestock markets:
    - Establish relevant grades and standards, considering informal standards
    - Clarify and enforce licensing policies
    - Make tax system more transparent
    - Curtail “roadside payments”
    - Invest in market infrastructure, market information system
    - Develop marketing credit; may be based on a warehouse receipts system for grains
    - Improve legal system for contract enforcement and protection against theft

DISCUSSION

Comments and questions

C: A key question is what is the limiting factor for crop production. This is a critical issue affecting potential of different land management options, can be used in classifying recommendation domains.

C: We should not only base our classifications on agroecological factors, we need to also consider socioeconomic factors. Our recommendations should be based on social development domains.

C/Q: We should integrate the policy implications that come out of different papers. A point at hand is: one study (on land management) advocates expansion of off-farm employment and another study advocates licensing of small traders. But those small traders seem to be the ones that are those engaged in off-farm activities. Do we really need standards for local markets? I think the issue of standards is not important.

A: Before 1997, licenses were given to traders without limitation. However after the proclamation of number 87/97 a minimum amount capital was required to issue a license. For example, in Addis and Dire Dawa, a minimum of 5000 Birr is required to issue a license. Any trader can register if he invests less but may not be required to pay tax.

Q: Are there no large-scale traders in the grain and livestock markets? Farmers have limited knowledge about trade. In this situation tax evasion will be one of the main characteristics of grain trade in Ethiopia.

C: Grading and standardizing are very important market functions; they help reduce transaction costs.

C: There is only one internationally and nationally accepted grain standard and there is no local vs. export standard as such. Ethiopia has grain standards; the problem is lack of awareness and implementation of the standards that have already been set.

PANEL PRESENTATION

Ato Yibrah Hagos, Relief Society of Tigray (REST)

Mr. Chairman,

Your Excellency the Vice Minister of Agriculture,

Ladies and Gentlemen,

On behalf of REST (Relief Society of Tigray), I would like to thank ILRI, IFPRI and other organizers of the workshop for inviting REST to share its experience with you in this important workshop.

REST is an Ethiopian Non-Government Organization implementing a wide range of relief, rehabilitation and development activities in the national regional state of Tigray since 1978. REST has always been a grassroots organization, committed to working with the poorest and most marginalized communities to bring about positive, sustainable change.

REST's strategy articulates a special role for programs in supporting erosion control, afforestation and water programs. Its major operational programs focus on environmental rehabilitation and agricultural development and rural water supply development. For this it has established specialized technical departments, called the ERAD, RRD, RUWAS.

Owing to the long history of agriculture, poor cultural practices and rapidly growing population, the natural resources in Tigray have been subjected to severe land degradation and soil erosion. The indiscriminate removal of vegetation cover and

extreme depletion of the soil depth disrupted the normal hydrological cycle and environmental equilibrium causing recurrent droughts and famine.

In Tigray; agriculture remains the principal income source for 85 percent of the population despite its low productivity and high risk.

REST'S EXPERIENCE OF LAND MANAGEMENT AND APPROACH TO SOIL, WATER CONSERVATION, AND AFFORESTATION

As stated earlier, environmental degradation is a problem in Tigray Region. The land surface of Tigray Region that we see today is mainly a reflection of the past erosion processes. The main causes of soil erosion in the area among others are deforestation, over-cultivation, over-grazing, steep topography, high rainfall intensity and unprepared land-use management. The degradation in the Region is evident by the huge amount of soil loss, by water erosion and by very low productivity of the farmlands. Therefore, to rehabilitate the environment and enrich it to a meaningful level, a concerted effort has been carried out by the REST.

The purpose of REST's soil and water conservation (SWC) program is to improve crop productivity by conserving the natural resource base through reducing soil loss and improving the moisture retention, and capacity of the degraded sites. Improving forage production of degraded grazing lands is another purpose of the SWC program. In addition, the SWC program has created foundation practices on the watershed through an integrated approach. The SWC program also improves the water resources of the intervention area.

In the SWC program various types of physical and biological SWC measures have been undertaken in the watersheds. The activities are: catchment treatment,

reclamation of big gullies, moisture harvesting on farms and degraded grazing lands, SWC on hillside lands.

APPROACH

SWC activities are planned using watershed approach through integrated watershed management. All conservation activities are planned and based on a participatory planning approach with the community. The watershed development areas are those areas selected to benefit from all program components implemented in an integrated manner.

MODE OF IMPLEMENTATION

The implementation of SWC is carried out in collaboration with the *baitos* (local councils), the Bureau of Agriculture and Natural Resources (BoANR) and the beneficiary rural community. It is implemented by a labor contribution of the farming community (free labor contribution) and using Food for Work (FFW). REST, the woreda BoANR, the woreda administration, the *baitos* at tabia (community) level and the technical leader of the community are responsible for planning, implementation and providing administrative as well as technical support.

MODALITIES OF FFW

- SWC activities are undertaken through FFW.
- Targeted beneficiaries are all able bodied persons living in the area.
- The community is well organized into working groups or "Gujjle" consisting of about 10-15 beneficiaries.

- Payment is made according to the achievements and work done.

FFW is one of the important employment opportunities in the area to supplement the income and employment of the target population and women are a majority in implementing SWC activities using FFW.

FREE LABOR CONTRIBUTION

Communities also contribute free labor to the SWC activities annually. They provide 20 days per year free labor per adult contribution to community development initiatives. This is a typical experience in land management as related to sustainable development, in particular through raising the contribution and input of the community.

TRAINING

Capacity building of community members in SWC aspects is one of the major components of SWC intervention. Trained farmers, contour markers and production leaders lead and supervise implementation. Due to this intervention, more and more farmers are adapting the SWC techniques on their own farmland. This indicates the effective knowledge transfer and awareness created.

IMPACTS OF SWC

- Soil loss reduction
- Reduction in surface runoff and flood damage
- The hydrological behavior of the watersheds has improved (base flow in streams and springs increased)
- Sediment load to reservoirs reduced and as a result the life expectancy of storage tanks improved

- Crop yield improvement due to soil moisture enhancement
- Vegetation cover improvement
- Increased availability of forage for livestock
- Increased job availability due to the FFW
- Develops farmers' culture of introducing SWC techniques privately on their own land
- Encourages women to participate in different development activities.

REFORESTATION AND AREA ENCLOSURE

Area enclosure is one of the strategies for rehabilitation of degraded hillsides in Tigray. As a result:

- Vegetation composition and coverage density is being increased at all enclosure sites.
- Water run-off hazard on down stream farmlands has decreased.
- Farmer's income increased as a result of selling wood and grass and have been able to feed harvested grass to their cattle.
- Area enclosure has brought impressive changes in terms of restoration and reduction in soil erosion and overall agro-ecological stabilization.

WATER AND SANITATION

With regard to the water development, REST has constructed numerous hand-dug wells, ponds and small-scale irrigation schemes. In Tigray, irrigation could make an important contribution to improved local food security.

CHALLENGES AND PROBLEMS ENCOUNTERED

- Presence of free grazing
- Lack of research and improved technologies on water harvesting technology

CONCLUSIONS AND RECOMMENDATIONS

From REST's experience, it has been realized that:

- More refined action-oriented research is needed to alleviate the suffering of people in drought-prone areas.
- Communities must participate fully in land management activities if long-term sustainability is desired.
- Technical supervision and follow up must be strong.
- The unskilled farmer needs to be trained for long-term multiplier effects.
- Careful experimentation with technical soundness of activities should precede full project implementation.
- The resource requirements for implementing land resource management are enormous. Considerable efforts will have to be made to mobilize increased flow of resources.

DISCUSSION

Q: Why is the free grazing system continuing unabated in Tigray? There is a policy paper study on this issue and has a policy answer for this problem. Why is its recommendation still not implemented?

C: Free grazing in Tigray is not still a problem. Rather there are certain actions taken in the region like area enclosures where livestock are not allowed free grazing, creating cut and carry feeding system, and in some areas people are reducing overgrazing by allowing only oxen to graze.

C: There are already efforts to restrict animals from grazing. Good examples are thousands of the area enclosures all over the regions. There are also good beginnings in restricting animals from entering into irrigable areas to protect fodder tree plants in Wajirat woredas. We have to provide alternative grazing areas.

C: To solve the problem of free grazing, policy makers have to address land tenure issues. The issuance of land certificates to the landowner may help a lot to restrict free grazing.

Q: What is the philosophy of REST concerning its future – will it continue to provide employment to the people and rehabilitate the environment – for how long? Social researchers must study why farmers' service cooperatives are not successful so far.

C: Action oriented research that can complement integrated watershed management should be undertaken**.**

C: REST's advocacy for action-oriented research is in line with the interest of Irish Aid. Irish Aid supports the idea of REST.

PANEL PRESENTATION

Ato Asmamaw Maru, Amhara Regional Government

SUMMARY OF POINTS MADE

- The Amhara region has identified ten development areas for marketing development.
- The comparative advantages of the region (commodity based) should be identified. We want to benefit from the export market.
- There are several important knowledge and capacity gaps:
    - Capacity building is needed in marketing research.
    - Promotion of traders in marketing, and information availability is lacking.
    - Farmers are not organized to solve their own problems.
    - Identification of comparative advantage to enter the export market.

SESSION VI: WORKING GROUPS – DISCUSSION OF PRIORITY POLICY ISSUES AND KNOWLEDGE GAPS RELATED TO MARKET DEVELOPMENT AND LAND MANAGEMENT

Group 1: Land Management in Less-Favored Areas

Group 2: Livestock Marketing

Group 3: Grain Marketing

SUMMARY OF GROUP 1 DISCUSSION: LAND MANAGEMENT IN LESS-FAVORED AREAS

This group discussed the critical constraints for sustainable land and natural resource management in the northern Ethiopian highlands and identified core elements for a strategy towards improved resource management in less-favored areas.

Core Problems:

- Heterogeneity of less-favored areas, both regarding socioeconomic (access, population density) and agroecological (soils, weather) dimensions

a) Key similarities:

- Cereal based production systems and mixed crop-livestock systems
- Moisture stress (cropping systems)
- Pasture management
- Growing awareness of the importance of land management (SWC, nutrients, etc.)

b) Key differences:

- Variability in soil quality/types
- Access to markets
- Population density

- Key constraints for improved land management:

- Moisture stress
- Low soil fertility
- High rate of soil erosion

- Insecure land tenure
- Deforestation
- Lack of off-farm employment opportunities
- Too many religious holidays

- Summary of constraints:
  - Biophysical constraints (moisture, infertility, etc.)
  - Institutional constraints (marketing, land tenure, management of communal land, etc.)
- Packages/solutions:

a) Moisture availability increasing packages based on water harvesting (ponds, river diversions, ridging, mulching, etc.). During the dry season, small to medium scale application in targeted potential areas. Information is needed on the impact of these schemes on production, health, and people down stream.

[Action required by BoANRD, universities, research institutes]

b) Reducing transaction costs (roads, increase competition, reduce cost of inorganic fertilizer and feed, etc.). An integrated approach based on the following components:

- Integrated soil fertility management (organic matter application, inorganic fertilizer application, etc.)
- Plant trees to guarantee that manure residues go to the farm
- Agroforestry

- Crop rotation, intercropping, etc.

[Actions required by Government, private sector, NGOs]

c) Rehabilitation of degraded areas through

- Biophysical control measures
- Guarantees that community members directly benefit from efforts made towards rehabilitation of communal lands
- Profitable conservation-based crop production systems

[Actions required by communities, BoANRD, NGOs]

d) Land certification

- Develop improved procedures for land administration
- Institutional support
- Research on land policy reform
- Land market reforms (lease period interference)
- Free tenure security

[Actions required by MoRD, MoA, research institutions]

e) Combat deforestation

- Enclosures
- Private plantations
- Fuel saving developments

[Action required by COMM, BoANRD]

f) Free labor migration (because land rights are lost if absent for 2 years

- Propose safety net programs

- Improve information on the labor market

[Action required by MoLSA]

Comments/questions:

- The number of religious holidays observed is a key constraint that affects yields, so policy makers should pay attention to this.

- Land certification is only a half-hearted approach to addressing the land tenure problem, so why not consider other approaches?

- Land certification in Tigray has helped to improve security but it did not totally remove insecurity, so more work needs to be done. Regarding the issue of tenure choice, there is tremendous literature in sub-Saharan Africa that states that private ownership is not necessarily superior. So the key issue is to see which system better addresses land security and consider the impact of this on natural resource management.

SUMMARY OF GROUP 2 DISCUSSION: LIVESTOCK MARKETING

This group discussed the priority areas and knowledge gaps for improving livestock production and marketing and identified main actions for enhancing the efficiency of livestock markets

Priority areas and knowledge gaps:

- How to transform livestock production into a market-oriented system?
    - Is the market chain from producer to consumer functioning efficiently?
    - Are consumer preferences and prices transmitted properly to producers?
    - Do producers produce the products that consumers want, or are they just trying to sell what they produce in surplus?
    - What are the requirements for transformation of the system, in terms of technology, infrastructure (roads, transport, slaughter houses, health services, etc.), institutions, market information (prices, supply and demand conditions), grades and standards?
- Roles of different actors
    - What role could the public and private sectors play in facilitating linkages of producers to domestic and export markets?
    - What roles could traders associations and cooperatives play? Could an association of domestic traders be useful?
- Product quality and safety

  - How to assure that producers respond to consumer concerns about product safety and quality? What technologies, institutions and regulations are needed; what options are available and what trade-offs are involved?

- Livestock trade issues
  - What strategies and investments are needed to address concerns about diseases that affect livestock trade; e.g., Rift Valley Fever. What infrastructure, institutional and technology options are available, which are affordable and feasible and what trade-offs are involved?
  - What should be done about unofficial cross-border trade in livestock? There are government concerns about loss of official foreign exchange earnings and tax revenues. What are the impacts of such trade, who gains or loses, and by how much?
  - How to facilitate trade? Awareness, capacity building needed.
- Legal and fiscal regimes: licenses and multiple taxes
- Finance and insurance services; lack of working capital (mainly young traders)
- Land tenancy, draft power and land management
  - What are the impacts of restrictions on land market and other factor markets on use of draft power and land management?
  - What steps can be taken to facilitate development of such markets beyond close family ties?
- Non-draft services of livestock
  - What changes in savings and credit functions of livestock will result from increased commercialization and monetization of the rural

economy, with what costs and benefits to farmers and other market participants?

- What changes may emerge in the mixed crop-livestock systems of the highlands vs. the pastoral systems of the lowlands, and what will be the implications of these changes?

Actions:

- Addressing traders' concerns (high transaction costs; limited credit, trust)
- Linking interest and public-private concerns of the government, traders welfare, consumers and producers (on issues of prices, quality, security, availability and margins)
- Enhancing trade facilities: improved market awareness (information) and building capacities and skills

SUMMARY OF GROUP 3 DISCUSSION: GRAIN MARKETING

This group discussed the structure and operations of local grain markets and identified some core issues for improving marketing efficiency.

Priority intervention areas to improve grain marketing efficiency:

1. Improving the bargain power of producers
    - Formation of marketing cooperatives and/or groups
2. Capacity building
    - Improving the marketing skill of traders or all market participants
    - Promoting the formation of traders' associations
3. Market-oriented production systems
    - Marketed surplus generation
    - Quality improvement of products
    - Improve farmers' decision making in the production system

Needs and Requirements for Action

- Institutional support
- Infrastructure and transport
- Improving the input supply and delivery system
- Selection of the right varieties and quantities

- Improving the market information system beyond price information, quality demand and supply
- Attractive prices with different prices for different grades
- Regional specialization
- Considering market information system as a public service
- Strengthening awareness creation to producers
- Availability of credit service
- Improving the land market operations
- Marketing function such as physical function (storage, transportation, handling, loading and contract enforcement), exchange function and facilities

On which market should we focus?

- Domestic market such as barley and other import substitutable grains
- Export market such as pulses and oil crops
- Commodity development plan should be implemented for each commodity
- Focus on some tradable crops where there are major gaps, such as beans
- Technical support required for export marketing, capacity building in processing

DISCUSSION COMMENTS

- Care should be taken in food aid management. For instance by promoting local purchases, appropriate production estimates.

- Economics of storage should be given due consideration, given the high marketing costs for sacking, handling, etc.
- Warehouse receipt system should be in place.
- Enforcement of grades and standards requires more attention.

SESSION VII: CLOSING SESSION

Synthesis of Recommendations from Working Groups and Priorities for Future Research

John Pender

Closing of Workshop

H.E. Ato Gebremedhin Belay

SYNTHESIS OF RECOMMENDATIONS FROM WORKING GROUPS AND PRIORITIES FOR FUTURE RESEARCH

John Pender

International Food Policy Research Institute

RECOMMENDATIONS FROM WORKING GROUPS AND DISCUSSIONS

Land management

- Increase soil moisture availability
- Invest in roads to increase profitability of fertilizer
- Promote integrated soil nutrient management
- Rehabilitate degraded areas
- Improve land tenure security and land markets
- Reforestation
- Promote off-farm employment/migration

Livestock markets

- Transform from a subsistence-oriented to a market-oriented system
- Establish grades and standards
- Market information
- Infrastructure
- Technology development for livestock products
- Finance and insurance

- Improve capacity building and extension
- Improve disease control

Cereal markets

- Transform from a subsistence-oriented to a market-oriented system
- Improve producers bargaining power through cooperatives
- Enhance trader marketing skills through traders associations
- Improve grades and standards
- Improve input supply systems
- Improve market information
- Improve market infrastructure to reduce storage and handling costs, warehouse receipt system
- Identify export niches/comparative advantages
- Capacity building in processing
- Food aid management – local purchases, early warning

Cross cutting issues

- Importance of targeting policies and investments to different development domains
- Linkages across issues; e.g.
    - Effect of land tenure on land management, labor mobility, etc.
    - Linkages between livestock and grain markets

- Substitute markets for livestock functions (e.g., traction, savings, etc.)
- Linkage between input and output markets and land management

PRIORITIES FOR FUTURE RESEARCH

- Identifying profitable packages for different domains
- Costs, returns and impacts of water harvesting ponds, irrigation and soil nutrient management options
- Value added creation for reducing livestock stocking rates
- Impacts of land policy options (e.g., certification vs. ownership)
- Credit/savings/insurance options to promote market oriented production
- Appropriate public and private grades and standards regimes
- Factors affecting development and effectiveness of producers and traders associations

DISCUSSION

- A key issue that needs to be addressed is how to transform subsistence agriculture into a market-oriented system.
- One future area of research in relation to various development options is the role of peri-urban agriculture and agro-processing in the context of strengthening rural-urban linkages. This has to be considered in the medium to long-term time frame.

CLOSING OF WORKSHOP

H.E. Ato Gebremedhin Belay, Vice Minister of Agriculture

SUMMARY OF CLOSING COMMENTS

- The research needs to focus and specialize. In specializing we need to see the overriding priority within the focused research. In identifying the priority area, one needs to see the broader linkage with different sectors so that change can be realized.

- Most of the recommendations of this workshop have been presented earlier in other forums. Emphasis needs to be put on how to demonstrate these recommendations on the ground.

- Although some of the research results are clearly presented, some still need clarification. For example, the recommendation of credit, savings and insurance options to promote market oriented agriculture I believe suggests availability of adequate financial services in Ethiopia; but the reality is the contrary.

- This is a good start but the development challenges we face are great and we have a long way to go.

- I would like to thank the workshop organizers and development partners: ILRI, IFPRI, WU, government institutions represented here, Mekele University, and others for a successful workshop.

ANNEX 1. WORKSHOP OBJECTIVES AND AGENDA

POLICIES FOR IMPROVED LAND MANAGEMENT AND AGRICULTURAL MARKET DEVELOPMENT IN THE ETHIOPIAN HIGHLANDS

Workshop

Ghion Hotel, Addis Ababa
February 19-20, 2004

OBJECTIVES

- To review and discuss with key stakeholders the main findings and policy implications of research on agricultural markets and sustainable land management in Ethiopia under the project "Policies for Sustainable Land Management in the Ethiopian Highlands – Phase II"

- To discuss options for improving the development of agricultural markets and land management in Ethiopia, considering perspectives of different stakeholders

- To develop recommendations for priority policy actions and further research based upon consideration of lessons learned and remaining knowledge gaps

Agenda

Time	Topic	Presenter/facilitator
DAY 1: FEB. 19		
8:00-8:30	Registration	
Session I	Opening session	Chair: H.E. Professor Mesfin Abebe, Advisor to the Deputy Prime Minister
8:30-8:45	Welcome remarks	Dr. John Pender, IFPRI
		Dr. Ruerd Ruben, WUR
		Dr. Bruce Scott, ILRI
8:45-9:00	Opening of workshop	H.E.Ato Gebremedhin Belay, Vice Minister of Agrriculture
9:00-9:20	Background and overview of the project, objectives of workshop	Dr. John Pender, IFPRI
	Questions	
Session II	Agro-ecological and bio-economic analyses of land management in Tigray	
9:30-9:50	Research approach and major results of Wageningen University research in Tigray	Dr. Ruerd Ruben, WUR
	Questions	
10:00-10:30	Coffee break/group photo	
10:30-10:50	Results of agro-ecological analyses in Tigray	Dr. Herman van Keulen, WUR
	Questions	
11:00-11:20	Soil nutrient flows and the need for integrated nutrient management in the northern highlands of Ethiopia	Dr. Assefa Abegaz, MU
	Questions	
11:30-11:50	Impacts of policy and livelihood options on poverty and sustainable land use in Tigray: Results of a bio-economic model	Dr. Gideon Kruseman, WUR
	Questions	
12:00-12:15	Discussants' comments	Dr. Kidane Georgis, EARO Dr. Berhanu Gebremedhin, ILRI
12:15-12:30	Discussion	
12:30-13:30	Lunch	
Session III	Performance of grain markets	
13:30-13:50	Overview of structure, conduct and performance of grain markets	Dr. Wolday Amha, AEMFI
	Questions	
14:00-14:20	Spatial efficiency of maize and wheat markets in Ethiopia	Dr. Eleni Gabre-Madhin, IFPRI
	Questions	
14:30-14:50	Firm level analysis of grain trader	Dr. Eleni Gabre-Madhin

Time	Topic	Presenter/facilitator
	performance	
	Questions	
15:00-15:15	Discussants' comments	Dr. Alemayehu Seyoum,
15:15-16:00	Discussion	
16:00-16:30	Coffee break	
Session IV	Performance of livestock markets	
16:30-16:50	Structure, conduct and performance of livestock markets	Dr. Sam Benin, ILRI
	Questions	
17:00-17:20	Trader behavior and transactions costs in live animal trading in Ethiopian highland markets	Dr. Mohammad Jabbar, ILRI
	Questions	
17:20-17:30	Discussants' comments	Ato Belachew Hurissa, LMA Dr. Berhanu Gebremedhin, ILRI
17:30-18:00	Discussion	
18:00	End of first day	
DAY 2: FEB. 20		
8:30-8:45	Synthesis of lessons learned from studies and discussion on first day	Dr. John Pender
8:45-9:00	Discussion	
Session V	Panel discussion: How to improve markets and land management in the Ethiopian highlands?	
		Ato Yibrah Hagos, REST
		Ato Asmamaw Maru, Amhara Regional Government
10:00-10:30	Discussion of panel presentations	
10:30-11:00	Coffee break	
11:00-12:00	General discussion of issues	
Session VI	Working groups – discussion of priority policy issues and knowledge gaps related to market development and land management	
12:00-12:15	Formation and terms of reference of working groups	
12:15-13:30	Lunch (working groups meet at lunch)	
13:30-14:30	Working groups discussion	
14:30-15:30	Plenary presentations by working groups, questions, discussion	
15:30-16:00	Coffee break	
Session VII	Closing session	

Time	Topic	Presenter/facilitator
16:00-	Synthesis and discussion of key issues, gaps, recommendations, next steps	Dr. John Pender/ Dr. Ruerd Ruben
17:00	Closing of workshop	H.E. Gebremedhin Belay

ANNEX 2: LIST OF WORKSHOP PARTICIPANTS

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