



# NEWSLETTER



Supporting the development of Commercial Agriculture  
Programs at four Ethiopian universities (ETH 019)

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## Preface

**By Carel Jaspers, director Q-Point**



This last newsletter will focus on our twelve PhD candidates, who worked in collaboration with Ghent University in Belgium and Radboud University in the Netherlands for the last 4 years.

In total five of our students, following a successful PhD defence, now work as a Doctor (Dr.) at their main university in Ethiopia. We expect that all other seven PhD students will graduate in 2017. The main value chains were coffee, malt and barley, apple, dairy, Oromo potato, red pepper as well as horses and rabbits. We trust that all results will have value for the community in Ethiopia and that the private sector in Ethiopia and Europe will be interested to use this information and knowledge to improve the food security situation in Ethiopia.

If any questions arise regarding the PhD research, all our students are happy to have contact with you for further discussion. I hope you enjoy reading.

Carel Jaspers



*One of the value chains was dairy.*

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## Effects of personalized transactions and institutional interventions on the performance of markets in Ethiopia

By Fekadu Gelaw Mersha



### What is the result of your study?

I have successfully finished my PhD study on November 23, 2016.



*Fekadu during his presentation.*

### What is the subject of your study?

My study was in the area of Institutional economics. I studied the effects of personalized transactions on the performances of coffee markets in Ethiopia. In addition, I studied the impacts of the institutional interventions made to change the personalization of transactions and to improve other aspects of the coffee markets.

### Why did you choose this topic?

Since the coffee markets is highly personalized, especially in the local coffee markets, I wanted to assess the efficiency of the arrangement on the coffee markets. In addition, I wanted to evaluate the impacts of institutional interventions made by ECX (Ethiopia Commodity Exchange) in improving the coffee markets.

### What is your experience as a student with the Nuffic Project?

Nuffic has given me the chance to study my PhD in one of the best known

universities in Europe. Studying my PhD at Ghent University was really a great experience both academically and socially. It not only exposed me more to the scientific world but it also exposed me to the western culture and socio-economic environment. It helped me to question my old beliefs.

### What is your ambition for the future?

To contribute to policy and institutional design for improving the agricultural markets in general and the coffee markets in particular to work for the poor farmers.



*Coffee berries.*

### What is the most striking difference between Belgium and Ethiopia?

The research and publication quality is strikingly different in that we learned on how to publish in reputable and high quality journals.

### Which major challenges in Agribusiness must be done on short-term (1 year) in Ethiopia? And on medium (5 year) and long-term (20-25 years)?

The study revealed that there is incompatibility between two institutional interventions: ECX and trademarking. In order to resolve this, in the short-term, ECX has to revise its regulation in a way that allows traders to transact outside ECX. In addition, ECX has to design alternative arrangements that incentivize

reputation of the three trademarked coffee origins (Yirgacheffe, Sidama and Harar). Moreover, ECX has to improve its operations to reduce delivery problems. In the medium-term, there should be a gradual policy change to liberalize the currently state-controlled and less competitive markets: in the foreign exchange markets, land markets, export markets, input markets, import markets, etc.

## Summary

The study was intended to analyze the role of informal institutions governing personalized transactions and institutional interventions on the performance of markets taking the coffee supply chain in Ethiopia as a case. We conceptualize that personalized transaction arises when buyers and sellers, given the institutional environment, choose an institutional arrangement that suits their interest. But the prevalence of such institutional arrangements substantially determines the broader socio-economic, political and physical environment. In view of this framework, the thesis reviews theories about personalized transactions as an institutional arrangement and how it evolved over time. It then explored the behavioral and historical origin of personalized transactions and assesses its prevalence at different socio-economic units. It thus examines its overall effects on the broader environment.

Using these historical contexts as a background, we explained the sources of personalized transactions in the case of local coffee markets. Past closed systems and communal/state ownership of property rights and excessive state involvement in the economic sector are responsible for the current inefficient institutions. The analysis suggests the powerfulness of private property and freer market on institutional evolution. We conclude that the current communal and state property rights will constrain the

development of institutions that can handle complex exchanges.

In order to identify the sources of personalized transactions, we measure the marginal effects of each attribute on the choice of farmers. The MNL revealed that all the attributes (price, trust, dependability, reliability, strictness, proximity and social relationships) we hypothesize to determine the preference of farmers in their choice of traders significant. All, except price and social relationships, can lead to farmers to embed their transactions in long-term relations. While price doesn't lead to personalized transactions, the social relationship attribute does. But since the MNL model doesn't capture preference heterogeneity, we use LCM to control for it. This enabled us to identify the different classes of farmers that share similar preferences. The result revealed that only a small proportion of farmers value social relationships. This suggests that the existing personalized relationship is a strategic response of farmers to market constraints and information problems. The detailed examination of the effects of personalized relationships on coffee quality suggests that personalized transactions are not an efficient institutional arrangement to incentivize quality maintenance.

To be sure, the issue was also examined from the traders' side. Descriptive analysis of survey data collected from trades suggests a similar result. The results indicate not only that personalized transactions are pervasive and increasing in recent times, the transaction risks faced by traders suggest the inefficiency of the personalized institutional arrangements. Given the historical context that forecloses the development of impersonalized transactions, we conclude that personalized transactions continue to govern coffee and other transactions in the local markets, despite their inefficiency.

While in the past such impersonalized transaction was pervasive even in the central markets, an institutional intervention was made to create a competitive and impersonalized transaction through ECX. To evaluate the efficiency of this institutional intervention we analyzed its speed and degree of symmetry of price transmissions between pairs of markets along the world-export-auction-local/retail coffee supply chain. The result revealed that the speed and symmetry of price transmissions have not changed considerably after ECX and the effect also varies between export and domestic markets. We conclude that as long as the local markets remain traditional and personalized and the export market little competitive, farmers will continue to receive a small share of the final price for their produce. All the evidence implies that improving the market to benefit farmers requires more than just improving institutions governing the central market.

Descriptive results obtained from survey data of producers and exporters showed that the intervention is effective in impersonalizing the transaction at the central markets. Most of the traders and exporters recognized the impacts of the intervention in reducing transaction problems such as payment failures, delivery, grading and the like. Yet, its impacts in improving the overall efficiency of the market were not as ECX claims. Some transaction risks are still there and transaction costs have not improved much. Moreover, the social landscape seems to have allowed some collusion among traders and exporters. Given the transaction situations where exporters and trader/suppliers cannot use alternative arrangements except ECX's auction floor, it is difficult to judge whether the observed transaction is

efficient or not. Moreover a given institutional arrangement tends to be efficient and dynamic when it competes with alternative arrangements. In addition, one arrangement could be more suitable than another depending on the attribute of the transaction. The existing transaction through ECX is designed to handle commodity-coffee but not brand coffee. It cannot incentivize brand (geographic origin) reputation. This is because, while transactions in the commodity market are necessarily non-traceable, transactions of GI-protected products at least require fully traceable transactions.

The government through the Ethiopian Fine Coffee Trademarking Initiative was able to get GI-protection in a number of European countries, USA and Japan. The initiative was to improve the bargaining power of exporters in the world markets. But a couple of years after this, the government also introduced a new rule that prohibits coffee transaction outside ECX: a rule in full contradiction with the institutional arrangement GI-protection requires. The two interventions: commoditization through ECX and trademarking are to our opinion fully incompatible – in terms of objective and structure of the transaction. This may not enable Ethiopia exporters of Ethiopian coffee to take advantage of trademark protections of Ethiopian coffee. Given this incompatible institutional interventions, we wanted to analyze the impacts of the trademarking initiative on prices of GI-protected Ethiopian coffee. We found the impacts of the trademarking on prices was positive and increasing over time. But when we analyze the impacts of ECX intervention, controlling other parameters, the impacts on prices of GI-protected coffee turns out to be negative.



## Value chain structure, integration and performance: the case of the malt barley value chain in Ethiopia

By Mulugeta Damie Watabaji



### What is the result of your study?

I have done with my internal defense and it went well. I was given minor comments to improve the dissertation and invited to the public defense to take place on January 26, 2017. Four papers were published or accepted for publication already on reputable A1 Journals. All of them were presented at different conferences. There is one paper which was presented at three conferences. All in all, the PhD study was just a successful journey.

### Why did you choose this topic?

Before I started my PhD study, I had worked as a member of the administrative board of the Harar Brewery which was later on acquired and became a full-subsidiary of the Heineken N.V.. I was wondering why Ethiopia is importing malt from Europe while it has a big potential at least to be self-sufficient to meet its malt requirements. It is a big paradox, if the country that is top ranked in the continent in terms of barley production fails to meet local demands for malt which is in fact very small compared to the country's potential. I had the feeling to study the chain and identify the key problems to be tackled to enable the country to save good amount of foreign currency it spends for malt import through import substitution. That was the main reason for choosing the topic.

### What is your experience as a student?

Apart from some minor limitations, it was a wonderful experience. Q-Point has coordinated the project well. Every staff member of Q-Point was so cooperative in making the budgeted resources available whenever requested with clear purposes and activity plans. However, we all faced series financial shortages during our stays

in Ethiopia since our salaries were not sufficient to sustain our families and the project failed to provide us at least small subsidy.



*During data collection.*

### What is your ambition for the future?

I have the ambition to become a resource person in the area of Agribusiness value chain, particularly in the agri-food and beverage value chains so as to partly fulfill the mandates of the Haramaya University, my employer, which are the teaching, research and community outreach services in my area of expertise.

### What is the most striking difference between Belgium and Ethiopia?

The major difference between Belgium and Ethiopia is that of the working culture. Here in Belgium, people are seriously working during weekdays. There are no tea-breaks as such. They take their tea to their table and drink their coffee/tea while working. There is not a single minute to waste. During the weekends, people take rest. They shut everything related to office works down, no one answers your mails during the weekends. I do not find new mails in my mail box on Saturdays and Sundays. In Ethiopia, we are mixing everything. There is no difference between working days and weekends. We waste a good amount of time during the tea-breaks.

We are also going to office during weekends. We do not focus on either working or taking breaks.

**Which major challenges in Agribusiness must be done on short-term (1 year) in Ethiopia? And on medium (5 year) and long-term (20-25 year)?**

The malt barley value chain which I researched during the last five years is characterized by weak integration among its members. Some of the malt barley value members do not have complete information about the chain and their chain partners. The chain involves multifaceted activities and processes that need to be coordinated from the input supplies for malt barley production till the beer is put into classes for final consumption. Effective coordination of these activities and processes require the commitment and collaboration of every chain members. Chain members should start to consider value chain integration as

a strategic tool to improve the overall performance of the chain. The weak link to the chain at any of the interfaces would sabotage the performance of the entire value chain since the whole system cannot perform well unless all of its parts are strong. Currently, the malt barley value chain suffers from the use of poor quality inputs that lead to poor quality outputs mainly due to fragmented small-scale malt barley farming, disorganized and unstructured cooperative organizations, too opportunistic traders, single government owned malt factory that holds both monopsony and monopoly position and import oriented malt supply strategy followed by breweries. These problems need to be fixed to achieve higher and sustainable chain performance. I would make my share of contributions in the form of briefings and orientations to the members of the malt barley value chain on the policy options implicated by my doctoral research in the years to come.

## Social capital, performance and welfare among apple producers of southern Ethiopia

By Sintayehu Hailu Alemu



**What is the result of your study?**

Not graduated yet. I have submitted my articles to different journals and am waiting for comments from reviewers. I expect to finish (defend) my PhD at the end of 2017 at the latest. I have been waiting for publications. So far I have one paper that has got published and another one in the process of resubmission (after entertaining reviewers' comments), the third and the fourth papers are under review. I have also a first draft thesis ready for submission but whenever something changes in the articles, due to reviewers' comments, the thesis also needs a related change.

This time it is ready for submission and the department will form committee that will examine the thesis.

**Why did you choose this topic?**

Taking in to account the theme chosen by the NICHE project and the university where I am working (Hawassa University) plus my interest.

**What is your experience as a student with the project?**

My experience as a NICHE program student was very nice especially my stay at Radboud University was interesting but coming back to Ethiopia I was expected to re-instate and teach at my home

university, which prevented me from being a full time student.

This affected my PhD project activities. For the future, if the project supports other students, it will be good to consider this issue and the timely disbursement of and ease of access to the research budget.

### **What is your ambition for the future?**

My ambition for the future is to teach agribusiness courses and conduct research on the value chain of various agricultural crops which can contribute to the rural poor and the country at large. Participate in policy formulation and implementation activities of the commercialization of agriculture.

### **What is the most striking difference between the Netherlands and Ethiopia?**

The Netherlands is suitable for research and education in terms of availability of academic resources (Books, articles, internet, workshop and seminars, office facilities and supervisors) and to work as a full time student. Efficient service delivery. But the weather is a bit difficult.

In Ethiopia the above resources are not adequately provided. But the weather is fine. Things are not as much expensive as in Holland (housing, food, transport etc.). The service provision also needs improvement.

### **Which major challenges in Agribusiness must be done on short-term (1year) in Ethiopia? And on medium (5 year) and long-term (20-25 year)?**

Disseminate the value chain concept to producers and the rest of the value chain actors and stalk holders. Improve coordination among the value chain actors.

Explore local and export niche markets for well commercialized crops and strengthen

the research and education system of the country.

Working on infrastructures that reduce transaction cost for the marketing of agricultural products.



*Apple production in Chenchä has improved the life of producers who especially have adequate knowledge on the technology.*

### **Summary**

In this thesis we are dealt with the production of apples at the Chenchä district of Gamo Gofa zone, Ethiopia. The specific objectives of the thesis are understanding the knowledge variation among the apple producers and how it contributes to quality apple production and performance, how social networks contribute towards better know-how on the apple technology along other knowledge sources, whether apple production, of SHGs, contributes to women's empowerment and whether income from apple and women's empowerment contribute to child welfare.

With these specific objectives we are able to come-up with the following findings: First, performance in apple production is related to endowments and the level of knowledge of the producer about the apple technology. From the endowments, capital is a crucial factor for both apple fruit and seedling production. Capital is represented by the amount of manure applied and the apple plantation asset

owned by the producer. Those who apply optimum amount of manure and planted more orchards perform better. Therefore, improving access to capital will better contribute in apple production. Land is also an important input for both, but fruit is demanding more land than seedling. Even though, the seedling needs smaller plot of land, due to the need for rotation in every other season it will be land demanding to keep producing seedlings for long period of time. Availability of land rental markets can contribute to the seedling production in addition to access to land through other means (buy, inheritance or public supply). Despite that both seedling and fruit production need labor, seedling production is more labor intensive than fruit.



*Manure for seedling production.*

Generally, we have found a 60% and 40% inefficiency level in apple fruit and seedling production, respectively. The lack of adequate knowledge of the producers on the apple technology has been found to be one of the drivers of the inefficiency. Producers who can easily differentiate considerable number of apple varieties, know modern and traditional ways of pest and disease control, those who can well manage the orchards and well understand how to graft seedlings are producing quality apple fruits and seedlings. Moreover, those who have the know-how on how to handle the produce until it

reaches their customers and have good market information are benefiting well from the apple business.

Second, producers who are more knowledgeable on the technology are those who attended pre- or post-adoption training on apple production and related topics and those who are well connected to knowledgeable networks available in the district. The Kalehiwot church is the leading institution (NGO) to import and adapt the technology in the locality and provide courses apart from the public extension service and other NGOs which have moderate contributions. Resource individuals around the Kalehiwot church are the key/central individuals in the information network of apple technology. Individuals who have long term experience in apple cultivation are working good on the orchard and the young producers are dealing well with the production of the seedling. Producers who have a higher frequency of contact with their three resilient apple technology information sources (alters) have a better know-how on how to deal with apples. This is true for literate farmers and visiting the orchards of other producers contributes more for the illiterate ones. Therefore, providing the necessary training, connecting to relevant social networks and cultivation experience will improve the producers knowledge on the apple technology if, on average,

an elementary school level of education that helps to understand both the tacit and explicit knowledge types in apple production is achieved. The public extension system may be more productive if it takes in to account the knowledge that resides in some institutions and social networks that can augment the formal sources and method of extension system that has been followed so far.

Third, the role of women in apple production and how they benefit from the



apple business has been distributed among gender lines was not known so far. But there are SHG initiatives which are aimed at empowering women from economic and socio-political point of view in the district. We looked at women from apple producing households that joined SHGs and those who didn't, to understand the impact of the initiative on the participating women. We have got a significant evidence for the benefit of women from the SHG initiative at community level on improving their socio-political dimension of empowerment. The SHG participation provides them a space and time to discuss their issues and share lessons from their colleagues. Moreover, the supports provided by different institutions, for instance training, increased their awareness and knowledge on different socio-political issues like health, education, human right, child trafficking and on different apple related issues. But we didn't get any significant economic impact on participating women. The participants largely agree that they will economically benefit from the initiative overtime. The perennial nature of the orchards obviously needs a few years to generate actual economic benefits. The expected success will be determined by the amount of effort they exerted and the coordinated effort from the supporting institutions and other partners.



*Weeding.*

Lack of adequate knowledge is one of the determinants that exclude the women from active participation in the business. Trainings specifically designed to promote women will improve their participation. Moreover, empowering women in general (at household and community level) will contribute to better benefit sharing outcomes from the crop in the household.

Fourth, the effect of income generated from apple production and women's empowerment on household welfare in general and the welfare of children in particular was analyzed. The quantitative analysis revealed that there is a positive effect of income generated from apple on household consumption. Households who generate a higher income share from apples tend to invest higher on household consumption. Empowered women tend to invest higher on their children's education and clothing. The key informants and focus group participants also agree that the contribution of apple towards child welfare is positive. Even though, most producers tend to invest the wealth generated from apples on constructing houses and buying other durables that indirectly contribute to children's welfare, they also improved child outcomes by investing on their other needs as well. Therefore, the evidence shows cultivating apples for cash along other activities has considerable contribution in improving household welfare given that women in the household are well empowered to bargain for allocation decisions. Empowering women to participate in apple production and actively participate in household decision making will improve their welfare as well as the welfare of other members of the household particularly children.

Generally, apple production in Chenchu has improved the life of producers who especially have adequate knowledge on the technology that might have been acquired through attending training, well

connectedness to good performing and knowledgeable individuals or by having experience on apple production and business. It is possible to improve the benefit of inefficient producers through improving their awareness and knowledge on how to deal with the crop and alleviating other bottlenecks in the production and marketing processes. Moreover, empowering women through different initiatives will improve their participation in the apple business and their share of benefits generated from the business. This in turn will improve the welfare of the household and enable them to reduce or eradicate the burden of

poverty that has been perpetuating overtime.



*Better quality apple harvest.*

## Dynamics and smallholder milk market participation in Oromia, Ethiopia

**By Birhanu Megersa Lenjiso**



In June 2016 Birhanu successfully finished his PhD study. He is currently a Post-Doctoral Scientist with CGIAR working on Gender and Agriculture.

### Dissertation abstract

In Ethiopia, the commercial transformation of a subsistence-oriented agriculture is viewed as a focal point of the agricultural development policy. The Growth and Transformation Plan (GTP) emphasizes the transformation of the agricultural sector, especially in terms of rapid diversification and commercialization, complemented by an effective marketing system. This is based on the assumption that smallholder commercialization leads to increased household income, meeting increasing demand for agricultural products and improving the welfare of the producers. Despite a long effort to commercialize the livestock sector in general and dairy production in particular, this sector faces various constraints that hinder active market participation of smallholder

farmers in the country. One of these constraints is the tradition that makes selling milk a social taboo, especially within the Oromo society. In recent years, several interventions, including the adoption of exotic cattle breeds, and new management skills and improved feeds have been prescribed to stimulate the development of milk market in peri-urban areas. Evidences show that these developments resulted in greater market participation of farm households and increased household income. However, the unintended consequences of these policies for the intra-household gender relations and resource allocation has received less attention. This study aimed to examine the effect of smallholder milk market participation on; intra-household time allocation, women`s intra-household bargaining power, dietary diversity and nutritional status of young children and parental investment in children`s education.

The first chapter examines the effects of smallholder market participation on intra-household time allocation in Ethiopia.

We followed 156 households for two consecutive days and recorded time allocated to dairying, domestic chores, schooling, wage work, and leisure. Propensity score matching was used to determine the average effect of household market participation on intra-household time allocation. Results show that market participant households spend significantly more time on dairying and non-dairying activities than non-participant households. There are also substantial gender differences in intra-household time allocation. Although men take up only a small part of the dairy activities, milk income shifts from women to men in participant households. Given that in participant households, women spend substantially more time on domestic and dairying activities, it is important that time-saving technologies are introduced to reduce their workload in the household. Women's participation in the formal milk market should also be strengthened to ensure their access to the milk income.



*Milk collection centers.*

The second chapter examines the relationship between smallholder milk market participation and women's intra-household bargaining position in Ethiopia, using a quasi-experiment and propensity score matching. In market participant households, milk income is higher and its control has shifted from women to men. Our data also indicate that men transfer this income partly to their wives. Qualitative findings indicate that men see this as a recognition for their wives' household maintenance responsibility. Women argue however that transferring

income is also men's tactic for reducing intra-household conflict. Overall, dependency between husbands and wives seems higher and a woman's bargaining position stronger in participant households.

The third chapter examines the effects of smallholder milk market participation on household milk production and consumption patterns, on dietary diversity and on nutritional status of young children in Ethiopia. Using FAO dietary diversity questionnaire, we followed 164 households and recorded all food items consumed by the husband, the wife, an adult boy, an adult girl and a child under five for two consecutive days. We used T-test, propensity score matching and regression analysis to analyze the data. Milk market participant households have significantly higher levels of milk production, household income, dietary diversity and nutritional status of young children. Despite significant differences in milk production in the two household types, no significant differences were found with regard to animal source food consumption. However, dietary diversity and nutritional status of children under five is better in participant households, thus indicating that smallholder market participation has positive effects on the food security nutritional status of farm households in rural Ethiopia.

The fourth chapter examines the links between smallholder market participation, gender and the willingness to invest in their children's education under three experimental conditions: decisions made privately, decisions made with information exchange and decisions made with communication between the partners. Willingness to invest in children's education was higher among mothers compared to fathers and in the conditions with knowledge about the partner's experimental situation compared to the private condition. Investments were also



higher among older parents and among parents with more children. If one of the partners invested more in the children's education, the other partner also had a higher propensity to do so.

The effect of smallholder milk market participation was strongly positive in the bivariate analysis but became

substantially weaker and only marginally significant in the multivariate analysis. We conclude that money in the hands of women and information exchange about income and investment opportunities has the potential to improve investment on child education in Ethiopia.



*Birhanu during his defence and graduation.*





## Proximate composition and minor constituents of oromo potato (*Plectranthus edulis*) as influenced by storage duration and potentials for value addition

By Gifty Abera Geleta



### What is the result of your study?

The nutritional, industrial potential for value addition of different accessions of Oromo potato was investigated.

### Are you graduated?

No. Although the course work was started early in 2012, due to some unforeseen circumstances and delayed release of money for research (field work) back home, the experiment started late. Although I have submitted the manuscript to a peer reviewed journal for publication, the publication process took more time than anticipated. Hence I couldn't meet the publication requirement of the university to submit the thesis.

### Why did you choose this topic?

Oromo dinich (dinich is the Amharic name for Potato) is one among the most widely consumed indigenous roots and tubers in Ethiopia. It is grown for its edible tuber and medicinal use in the country. Traditionally it is considered as a food security crop because it grows in harsh weather when other crops fail. However, its nutritional contribution and potential for value addition is not known. Moreover, appropriate processing technologies are not readily available for potential investors to fully exploit this crops. Thus considering those limitations will help to design a value chain development plan through which small scale farmers benefit economically.

### What is your experience as a student? With the Nuffic Project?

First I would like to take this opportunity to thank Nuffic for giving an equal opportunity for international students regardless of educational background. My

experience as a student in this project was good.

### What is your ambition for the future?

To work on the agri-business sector. Especially I would like to continue my carries in value chain development of indigenous but neglected vegetables and root and tuber crops.



*Plectranthus edulis* (Oromo potato).

### Which major challenges in Agri-business must be done on short-term (1year) in Ethiopia?

A number of challenges could have an impact on the agricultural production and output. However, the major challenges which discourage potential investors and damage the existing projects are: low productivity in the entire production and agri-food chain, lack of financial safety like agri-insurance and high post-harvest losses due to lack of postharvest technologies. Thus in addition to productivity, the value chain should be upgraded to produce high value agri-food products to meet domestic, regional and international demand.

## And on medium (5 year) and long-term (20-25 year)?

To work on factors that help in adding value to meet quality standards and reduce postharvest losses, such as improving and upscaling the postharvest infrastructures such as transport, storage, electricity, water supply and distribution systems, this in fact should be coupled with access to knowledge, research, technology and expertise in the area of Agri-business.



*Tubers from different accessions of Plectranthus edulis (Oromo potato) grown in Ethiopia.*

## Summary of the PhD Thesis

This project was designed with the objective of partially exploring the variability among oromo potato (*Plectranthus edulis*) accessions found in Ethiopia based on its nutritional contribution to daily human diet, potential for value addition and physicochemical and functional properties of native starch. *Plectranthus edulis* (Vatke) Agnew (syn. *Coleus edulis*) is one of the important tuber producing plants whose potential has not been fully investigated and realized. It is an indigenous crop to Ethiopia. Mature tubers are consumed as staple food as vegetable after boiling with skin or without contributing to the diet and household food security. However, despite its contribution, little research

attention is given to better understand the tubers diversity in nutrient composition and its potential for value addition. Hence, studying the diversity in nutrient composition among accessions is the first step to further value addition of the crop and prompt its potential commercial use.

## The PhD thesis contains eight chapters, i.e.:

1. Presenting an overview of the tuber physiology, research gap and objectives of the project;
2. Presenting materials and methodologies used for "Sampling and analysis, data processing", a description of instrumentation, and experimental design were written, in a detailed subchapter;
3. Deals with the variation in nutrient composition among tubers of eight accessions of Oromo potato, accessions were grown under similar conditions at Hawassa research field. At harvest mature tubers were analyzed and evaluated for their nutrient composition;
4. Where the composition, granular structure and pasting behavior of native starch were discussed, six accessions were compared;
5. The influence of traditional cooking and hand peeling methods on nutrients composition were assessed, three cooking methods (boiling, steaming and backing) and hand peeling with sharp knife were evaluated;
6. Deals with the change in nutrient composition with regard to the storage condition of the tubers, two storage conditions (pit/ underground and refrigerator) were evaluated in terms of the change in nutrients composition;
7. Discussed the nutritional contribution of Oromo potato to a human diet, for which tubers of different accessions were collected from places were potentially grown, analyzed for different nutrients and evaluated for

their contribution to human diet. At the end of each chapter a series of conclusions were drawn, based on the results obtained.

8. Presents the general discussions and conclusions, where the possible future investigations were also indicated. The PhD thesis ends with a set of references used throughout the thesis.

## Impact of cooperatives on smallholder coffee producers in Southwest Ethiopia

By Zekarias Shumeta



**When do you expect to finish your PhD?**

I am expecting to finish my PhD in June, 2017

**Is the PhD defense date already fixed?**

It is tentatively fixed to be at the end of May. But activities related with documentation and clearance may go till June.

**What is the main reason for delay?**

Apart from the technical reasons, waiting a very long time (more than a year) to get response from journals was the main reason for the delay.

**Why did you choose this subject?**

Coffee as a crop has a significant impact on income and employment generation for millions of Ethiopians. In addition, it is a major export crop of the country contributing for 25-30% of the foreign exchange earnings. But smallholders who produce more than 90% of coffee for export are not beneficiary from the market chain and some even started to replace it with other cash crops such as "chat". Therefore, I really need to identify the underlying problems and causes as studies made in these issue in the past are scant.



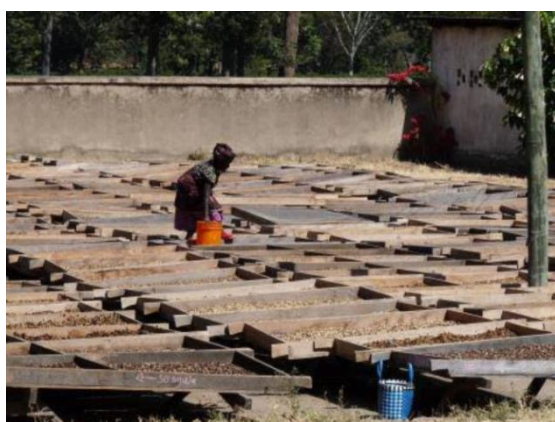
*Coffee as a crop has a significant impact on income and employment generation for millions of Ethiopians.*

### Summary of the thesis

Improved supply chain coordination should provide socio economic benefits to small producers who face market imperfections in the conventional mainstream chains due to their poor bargaining power. This arises from their limited access to market information, low levels of literacy and weak financial power. However, there are mixed reports on the success of coordination efforts through cooperatives and producer organizations as some studies demonstrated positive and significant impact while others revealed little effect.

The aim of this study is to investigate the impact of cooperative membership on conduct, performance and food security of smallholder coffee producers in the Jimma and Kaffa zones of Southwest Ethiopia.

The Jimma zone is one of the 12 zones in the Oromia region with an altitude of around 1700 m.a.s.l., and average temperatures that range between 8 and 28°C. Kaffa is part of the Southern Region of Ethiopia with temperatures around 18 to 21°C and the altitude ranging from 500 m.a.s.l in the south to 3000 m.a.s.l in the north and central highlands. Due to the favorable altitude and weather condition, coffee is a dominant crop and contributes the lion share to the livelihood of farmers in the two zones.



*Coffee berries drying in the sun.*

Chapter 2 describes the coffee value chains working in the region and gives insight into the different actors involved and the functions they perform. Attempts are made to address four major research gaps in the remaining chapters of this dissertation. The research questions answered are:

1. Do coffee cooperatives have a substantial impact in improving coffee production and marketing and do these effects differ among farmers and cooperatives?
2. Does certification have a positive and significant impact in reducing the probability and quantity of side-selling by cooperative farmers?
3. Do coffee cooperatives have a positive and significant impact in empowering member women and does that impact also substantially differ across cooperatives?

4. Do coffee cooperatives have a significant contribution in improving the food security of member farmers and does that effect differ across cooperatives?

First, by using cross-sectional household data and propensity score matching techniques, we investigated the impact of coffee cooperatives on performance of member farmers in Southwest Ethiopia using volume of supply, yield, price received and margins obtained as performance indicators.

The results were not statistically significant for any of the performance indicators. However, our heterogeneous impact analysis revealed that cooperatives have a significant performance impact for older and educated members with larger farms, and living in the Jimma area. Moreover, cooperatives seemed to differ in terms of the impact they have on their farmer members.

Second, the existing empirical literature on vertical integration in the form of coffee certification mostly focuses on direct welfare impacts.

However, certification is assumed to discourage free riding behavior (side-selling) of cooperative farmers as it secures premiums and market access to the producers. Certification was found to have a significant impact in reducing the quantity of side-selling but it had little effect on minimizing the probability of a member to side-sell. The results indicated that side-selling decreased with age, education, experience, availability of off-farm income, and trust in cooperative leadership while delays in payment and group size were found to induce side-sales by cooperative farmers.

Third, literature on the impact of horizontal coordination mostly focuses on direct economic performance effects of



participation in collective action. Impact of cooperatives on social performance such as women's empowerment is rarely addressed in cooperative literature. We therefore assessed the effect of coffee cooperative membership on women's empowerment via the construct of three latent factors of empowerment:

- participation in decision making and coffee sale;
- self-awareness and knowledge;
- access and control over finance.

Propensity score matching tested the effect of cooperative membership on these dimensions of empowerment but rendered no significant result. Yet, again these results were marked by a huge discrepancy between the cooperatives.

Fourth, using cross-sectional household data and inverse probability weighting estimation, we assessed the effect of coffee cooperative membership on food security using food crop production, input utilization (proxy for technological innovation), expenditure on food and income as measures of food security. The

results revealed that cooperatives succeed to enhance food production via increasing access to technological innovation, but the impact in improving income and food expenditure is weak.

Overall, it can be concluded that coffee cooperatives are multifunctional and there is a trade-off between the different functions of cooperatives in the area. That is, coffee cooperatives are effective in technological transformation via delivering improved inputs for food crop production but weak in increasing the performance of coffee markets. Our study showed the relevance of going beyond comparing the average effects, as the impact of cooperative membership is influenced by member and cooperative characteristics. Furthermore, as most empirical literature focused on direct economic effects of participation in a product market, our study demonstrates the importance of social impact such as women's empowerment and the indirect spillover effects on food security in order to understand the overall performance.

## Biophysical controls of specialty coffee quality in Jimma zone

By Kassaye Tolessa Sherge, Jimma University, College of Agriculture and Veterinary Medicine



### What is the result of your study?

Kassaye is graduated on March 28, 2017.

### Summary

Coffee is the world's most popular beverage and the second largest traded commodity after oil. It is appreciated mainly for its characteristic taste and aroma. The crop has been known and remained Ethiopia's most important source of foreign currency, accounting 25-30% of GDP.



*Kassaye successfully finished her PhD study.*



*Kassaye with the team of professors.*

The country, on the other hand, is recognized as the endemic region of origin and wide diversity of Arabica coffee and has enormous, unexplored potential to produce top specialty coffees. The increase in demand for high quality, specialty coffee with specific characteristics triggered coffee producing countries to produce specialty coffees for these high-end markets.

In Ethiopia, using total specialty cup scores, coffees are grouped into two top specialty classes: specialty 1 (Q1, scores  $\geq 85$ ) and specialty 2 (Q2, scores  $80 - < 85$ ).

This classification resulted in market segmentation and higher prices at international markets. Thus, improving coffee quality is a key opportunity for increasing coffee exports and price for coffee producing countries like Ethiopia. Genetic traits, growing environment, management practice (e.g. harvest period and postharvest processing methods) and actors within the value chain are thought to affect coffee quality. In this PhD thesis, influences of altitude and shade combined with harvest period and postharvest processing methods on quality and biochemical composition of coffee beans in Mana district, Jimma zone, Ethiopia has been investigated. Variability of coffee qualities among different coffee actors along the value chain combined with

sorting and postharvest processing methods in Mana, Goma, and Limu districts were also studied. Furthermore, this PhD study developed a near infrared (NIR) based model to predict coffee cup quality from green coffee bean NIR spectra.



*Shade level quantification using SunScan canopy Analyzer.*

Coffee quality increased with increasing altitude and shading. Coffee beans grown at high altitude (1950 – 2100 m.a.s.l.) gave superior coffee quality and about 87% of the coffee beans qualified for Q1 coffees. At mid (1600 – 1650 m.a.s.l.) and low (1450 - 1550 m.a.s.l.) altitude, however, almost all coffee beans classified as Q2. The study also showed that harvesting period and coffee processing method affect coffee quality. Coffee beans harvested at early to mid-season period improved coffee bean quality. Compared to late harvesting, early harvesting increased the percentage of Q1 coffee from 27 to 73%, at high, and from 7 to 20% at mid altitude.

Moreover, dry processing positively influenced coffee quality and increased the percentage of Q1 coffee beans by more than 50% compared to washed coffee. However, to improve the quality of dry processed coffee beans, proper coffee cherry e.g. ripe red coffee cherries need to be delivered. Sorting coffee cherries before dry processing further enhanced the share of Q1 coffee beans. In addition,

because of easy of management, low production cost and eco-friendly nature, dry processing should be recommended over washing methods.



*Selective picking of red ripe coffee cherries.*

Both altitude and shading also affect biochemical composition of green coffee beans. Coffee beans grown at mid altitude and open sun accumulated higher content of total chlorogenic acid (46.5 g kg<sup>-1</sup>). At high altitude and open sun, on the other hand, the content decreased to 40.5 g kg<sup>-1</sup>. The highest caffeine content (17.9 g kg<sup>-1</sup>) was obtained from mid altitude, dense shade and early harvested coffee beans, whereas the lowest level (14.5 g kg<sup>-1</sup>) was found at high altitude, medium shade and mid-season harvested coffee beans. In addition caffeine and sucrose were significantly affected by interactions between altitude and processing methods. High altitude grown coffee beans processed via dry, semi-washed and washed processing methods gave higher caffeine content than low altitude grown coffee beans. However, washed processed coffee beans gave lower sucrose content to dry and semi-washed beans at high altitude. At mid and low altitude, on the other hand, processing methods did not show significant differences on any biochemical compounds. Moreover, regardless of processing methods, the content of caffeine, total chlorogenic acid and sucrose increased with altitude by 11,

9, and 10%, respectively. In general the study indicates that altitude is the main driving factor affecting the compositions of green coffee beans.

Furthermore, coffee beans managed by cooperatives gave better quality than coffee beans managed by private traders. About 33 and 67% of cooperative coffee beans fell in Q1 and Q2, respectively. The majority of the coffee beans collected from private traders classified mainly into commercial grade 3 (ca. 78%), only 22% of the samples were qualified as Q2 and none as Q1. Proper harvesting and sorting of coffee cherries would help cooperatives and private traders to further enhance the share of specialty coffee from their production.



*Local market place at Mana district where farmers sell their coffee cherries to cooperatives and private traders.*

Besides coffee quality improvement, nowadays, the need for a fast and reliable coffee quality assessment method is increasing. Coffee cup quality assessment can be assessed organoleptically by professional coffee tasters, based on established terminologies for cup quality analysis (e.g. flavor, acidity and body). However, these evaluation methods are subjective, costly, time consuming, require sample preparation and may end up in biased grading systems. NIR is an increasingly growing technique for it is



fast, simple, cheap, reliable and for its ability to measure multiple qualities attributes at a time.



*Sorting of unripe and over ripe coffee cherries before processing.*

In this study, a NIR-based model predicting coffee cup quality from green bean NIR spectra has also been successfully developed. For this, partial least square (PLS) regression method was used to develop a model correlating spectral data to cupping score data (i.e.

cup quality). The results obtained suggest that NIR spectra of green coffee beans are a promising tool for fast and accurate prediction (i.e. Q1 vs. Q2) of specialty coffee quality. Thus, the method indeed simplifies coffee grading systems and reduces the time needed to grade beans by the conventional method (i.e. cup tasting). To achieve this, however, institutional (e.g. ECX) decision to integrate this new method into the current cup tasting system is required. In addition, the model needs to be further tested using a large number of data sets and coffee samples collected from different coffee growing regions in Ethiopia.

All together this PhD identified important biophysical factors that control coffee bean quality along the coffee value chain, opened up concepts and methodologies for enhancing coffee bean quality and developed a promising tool for fast and accurate assessment of specialty coffee cup quality.



*Dry coffee processing method. >>*



*Washed coffee processing method. >>*





*Physical coffee quality inspection.*



*Brewed coffee ready for cup quality evaluation.*

## Coffee market performance and producer welfare upon the introduction of the Ethiopian Commodity Exchange

By Tinsae Demise



### **When do you expect to finish your PhD?**

End of June is the most appropriate date to complete my PhD.

### **Is the PhD defense date already fixed?**

Tentatively the public defense will be at the end of May.

### **What is the main reason for delay?**

The main reason that I found during my study is the frequent travel between and short stay in Ethiopia and Belgium made me to lose concentration on my work. The work pressure that I have been through from my department while staying in Ethiopia is the other reason.

### **Summary**

Market policy reforms in the ever-changing global commodity market are needed to accommodate the needs arising from the domestic economy but also to sustainably integrate in the globalized commodity market. This doctoral work focuses on the type of reforms that aims to support marketing institutions in the creation of a market that serves all stakeholders. The general objective of this doctoral work is to examine the impact of

Ethiopian Commodity Exchange (ECX) introduction on the performance of and welfare of the Ethiopian coffee market. More specifically to:

1. analyze the co-integration of Ethiopian coffee prices with the international markets under origin differentials, before and after the establishment of the ECX;
2. the extent of spatial price integration of major coffee grower markets in Ethiopia, before and after the establishment of the ECX;
3. examine the dynamic relationships between the world and the domestic markets of Ethiopian coffee after the establishment of ECX;
4. investigate the welfare impact of de-commoditization on coffee producers marketing through membership of traceable coffee cooperatives.

The way how price relationships between the Ethiopian export coffee and other coffee exporting countries changed from pre-ECX to post-ECX was analyzed in chapter two. The study considered the price behavior of the various Ethiopian origin coffees and compared these prices to the prices of the different Arabica natural and Robusta coffees on the world market. Results show that during the pre-

ECX period all types of Ethiopian origin coffees established a long run co-integration with the prices of Arabica coffees on the international markets. Similarly, in the post-ECX period prices of all types of Ethiopian coffee except Harar co-integrated with the international prices of the Other Milds, Colombian Milds and Brazilian naturals. The price adjustment results in both pre and post ECX revealed that Ethiopian coffees adjusted more to the price of Colombian Milds and Other mild coffees. The study also finds that prices of Ethiopian origin coffees that fetch lower prices on the international markets adjusted more slowly to changes in prices of all Arabica coffees in the pre-ECX period and coffees known for their better quality seemed to adjust faster. This changed in the post-ECX period and the reaction time taken to correct the disequilibrium error was shorter for coffees that fetch lower prices and longer for prices of premium and higher priced Ethiopian coffees. This study showed that higher prices Ethiopian coffees behave independently in the international coffee markets.

The third chapter was set out to investigate if the levels of spatial coffee market integration in Ethiopia changed between 1998-2008 and 2008-2013, as a result of the introduction of the ECX. The study specifically examined the extent to which, despite there being a prohibition arbitrage trade between producer markets, the establishment of the ECX increased the integration of domestic coffee markets. The co-integration results revealed that between 2008 and 2013, the tendency of the market was towards regional integration of producer markets rather than to national harmonization. The producer markets in southern and southwestern Ethiopia were more integrated into a single market. In the post ECX period, even though it was limited, an opportunity was created for

lower priced coffee producing markets to establish themselves in the market. However, the market was dominated by the high-quality coffee producing markets.

The objective of the fourth chapter was to empirically investigate the market integration and price transmission asymmetry for the five major types of Ethiopian coffee along the coffee value chain after the establishment of ECX. The study considered the formation of ECX as a step towards the establishment of an institutionalized Ethiopian coffee market. A non-linear co-integration was found for the different coffee types along the coffee value chain. The results are depicted in the table below.

The question whether producers who market coffee through certified (and hence traceable) chains were better off was examined in chapter five. Generally, the investigation considered the production and welfare aspects of the household. Most producers relied on basic production techniques and were reluctant to adopt production techniques that require high operational cost. Despite the sustainable production activities intensively adopted by the certified and traceable producers, the coffee yield was much lower amongst cooperative members compared to the farmers in the control group. The yield differences may result from the older age of the coffee stock. Engagement in the certified and traceable coffee channels enabled producers to fetch a better and more stable price for their wet-processed coffee supply. Yet, this higher price was not sufficient to substantially increase coffee income.

The study also estimated the net cash returns from coffee and production costs on inputs and labor. However, no significant differences were found. Cooperative members were more inclined

to perform activities that could contribute to sustainable production, however, the lack of market-based approaches to promote environmental conservation create the notion that the sustainable coffee farming is not contributing to the wellbeing and economic prosperity of the coffee farmers.

Finally, the study showed that the heterogeneity impact of being a member of a certified cooperative. Generally, at the producers market the impact of ECX relies on the quality coffee supplied by the producer. The dominance of the traders in the export market is becoming the prominent challenge in creating a commodity market that could serve all stakeholders.

## Assessment of cell based therapies for cutaneous wound healing in rabbits and horses

By Bizunesh Mideksa Borena



On November 4, 2014, Bizunesh Mideksa Borena had her very successful Public Defense of the PhD thesis in Gent.

In 2011, she obtained as one of the 12 students a scholarship from NUFFIC-NICHE ETH/019 for PhD training in veterinary science, Faculty of Veterinary Medicine, Ghent University in Belgium and she was the first PhD candidate to have finished this long term training. During a two hours ceremony, she presented her research results and had to defend her PhD thesis for a team of 10 (inter)national professors.



*In 2014 Bizunesh defended her PhD thesis for a team of (inter)national professors.*

### Summary

Bizunesh Mideksa Borena joined Addis Ababa University, Ethiopia, in 1996 and graduated as a Doctor of Veterinary Medicine (DVM) in 2002. She worked as an assistant researcher for 10 months at Bako Agricultural Research Center, Oromia Regional Research Institute, for 2,5 years she worked at the department of clinical science, school of veterinary medicine of Jimma University, Ethiopia. In 2006/2007 she joined the graduate program at the Indian Veterinary Research Institute (IVRI) and obtained a Masters of Veterinary Science in Veterinary Surgery and Radiology. From 19/07/2008 to 2016 she worked as an assistant professor at Ambo University, Ethiopia, at different positions including department head and education quality and audit team leader. Recently she became V/President of Research and Community Service at Ambo University. She authored and co-authored 9 scientific papers in international peer-reviewed journals.

### Dissertation abstract

Veterinary patients are frequently affected by complex skin wounds. Skin injury may induce loss of skin's integrity with functional imbalance accompanied by disability or even death.

Despite a variety of therapeutic modalities proposed to accelerate the healing of acute and/or chronic wounds over the past decades, it remains important to develop novel and more successful approaches for wound treatment. Recently, various wound healing technologies that promote cell activity or minimize scar formation have been developed and some of them are being actively used at present. Regenerative medicine is among those new technologies. It aims to restore, maintain and improve body function. Regenerative wound therapy might prove to be one of the best alternatives where current conventional therapies fail or lead to inadequate results.

Cell therapy is a part of the broad field of regenerative medicine and it is defined as a set of strategies that use live cells with therapeutic purposes. Cells used in cell therapy can be broadly categorized as stem cells and adult/differentiated cells. Stem cells are undifferentiated cells, which have the capacity to differentiate into more specialized daughter /adult cells and have the ability to self-regenerate. Traditionally, they are divided into embryonic stem cells (ESC) and adult stem cells (ASC). Since ASC escape the ethical issues associated with ESC, they are the prime source for cell-based therapies and thus find their way through the regenerative landscape for treatment of several diseases in mammals. This dissertation contains a literature overview and own experimental work.

The general introduction (Chapter 1) consists of a literature review on different aspects of stem cell based therapies for cutaneous wounds. The isolation and characterization of adult stem/progenitor cells from bone marrow and skin is reviewed, followed by a description of the different routes of administration of stem cells and the evaluation of wound healing. This chapter introduces background

knowledge on techniques used in the experimental work of the dissertation.

Chapter 2 is devoted to an overview on regenerative skin wound healing in mammalian species. It highlights the adult mammalian wound healing as compared to the scarless wound healing in the mammalian embryos and amphibians and further discusses wound management in a general way. It gives an account of the current knowledge on cutaneous regenerative wound healing techniques with special emphasis on growth factors and cell based therapies. The most commonly cited growth factors and stem cells with positive effects on skin wound healing of mammals are discussed, particularly for rabbit and horse, the two animals species studied in this thesis. The experimental work focuses on two different types of cells in two different animal models: (1) Autologous bone marrow-derived nucleated cells (BMNC) and their potential use in cutaneous regenerative therapy in rabbit full thickness excisional (thoracolumbar region) wounds (Chapters 4.1 and 4.2) and (2) Epithelial-like stem cells (EpSC) and their in vivo regenerative capacity in full thickness excisional wound in horses (Chapter 6). New isolation and purification techniques for EpSC in horses are also developed in this work (Chapter 5)

The objective of Chapters 4.1 and 4.2 was thus to investigate the use of BMNC in rabbits ( $n = 20$ ) for wound healing. Wounds were treated by either (i) injection of bone marrow-derived cells into wound margin (BI), (ii) topical application of bone marrow-derived cells over the surface of the wound (BT), (iii) wound dressing with povidone iodine (PI) or (iv) with the normal saline (NS). The latter two constituted the two control treatments. The wounds were followed for 28 days after wound induction for evaluating the status of granulation tissue



formation and the wound contraction, and for assessing the wound histomorphologically and determining the time to complete wound healing.

Granulation tissue appeared significantly faster in BI. On day 21 wound contraction was significantly higher in BI (97.35%) than in BT (84.87%), PI (84.6%) and NS (92.59%) treated wounds. Histological examination of the healing wound indicated earlier disappearance of inflammatory reaction, significantly more neovascularization and fibroplasias, earlier laydown and histological maturation of collagen and better epithelialization were in BI and BT than in control wounds. Before applying EpSC in a clinical setting in horse skin wounds, the production of an EpSC dose was optimized in Chapter 5.

The sphere-forming capacity was used as an enrichment strategy in EpSC from equine skin. Skin samples were harvested from horses ( $n = 6$ , mares) and EpSC were isolated and purified from all the samples. In addition to their characterization based on immunophenotypic and functional properties, subsequent sphere formation was assessed upon isolation at passage 0 (P0) and at early (P4) and late (P10) passages in suspension culture using different culture media.

Different studies in animal and human models have demonstrated beneficial effects of autologous and allogenic mesenchymal stem cells on skin wound healing. Only a few reports are available on the difference between autologous and allogenic EpSC for the treatment of skin wounds. Therefore, Chapter 6 deals with the in vivo assessment of autologous and

allogenic EpSC-treated skin wounds in horses ( $n = 6$ , mares). In the gluteus region, 12 full thickness skin wounds of 2 x 3 cm were created and four treatment groups were considered: (i) autologous EpSC, (ii) allogenic EpSC, (iii) vehicle treatment (placebo) and (iv) sham operated. Each treatment group contained 3 wounds for double-blind macroscopic and histologic examination at week 1, 2 and 5. The results revealed significantly reduced circumference in wounds treated by autologous EpSC compared allogenic EpSC and placebo. The total granulation tissue thickness was 1257  $\mu\text{m}$  smaller in allogenic EpSC treated wounds ( $p = 0.0103$ ) and 1403  $\mu\text{m}$  smaller in the autologous EpSC treated wounds ( $p = 0.004$ ) as compared to vehicle treated wounds. Moreover young granulation tissue was 983  $\mu\text{m}$  smaller in allogenic EpSC treated wounds ( $p = 0.0247$ ) and 1135  $\mu\text{m}$  smaller in the autologous EpSC treated wounds ( $p = 0.0084$ ) as compared to vehicle treated wounds. Finally, In comparison to the vehicle treated wounds, the allogenic and autologous treated wounds were 26% ( $P = 0.0501$ ) and 32% ( $P = 0.0144$ ) closer to the intact skin thickness, respectively.

In conclusion, it has been demonstrated that regenerative skin wound treatment and more particularly cell-based therapies have a lot of potential, both from in vitro and in vivo studies of skin wounds in different animal models. In line with this, the experimental work in the present thesis indicates that full thickness skin excisional wound healing can be promoted using autologous bone marrow-derived cells and autologous and allogenic EpSC in rabbits and horses, respectively.

## Analyzing women's collective action: A strategy to empower Ethiopian women in the case of the red-pepper value chain

By Fitsum Wakweya Bayissa



**When do you expect to finish your PhD?**

September 2017.

**What is the main reason for delay?**

Waiting for publications and some are coming up.

### Summary and conclusions

In the developing world, including Ethiopia, poverty and women's disempowerment are the two major problems ever known. On the bright side, it is possible to eradicate poverty through empowering women (DFID, 2009, Manfre & Siegmann, 2010; Glenbow, 2011).

One of the commonly used development approaches to empower women is increasing their participation in the profitable aspects of agricultural value chains (Pionetti et al., 2011; KIT et al., 2012). In the last two decades, the Ethiopian government and developmental organizations have been investing intensively in terms of organizing and supporting female workgroups in the red pepper value chain. In Ethiopia, red pepper is one of the most promising commercial crops, and opportunely women have a comparative advantage in the red-pepper processing, because it is traditionally a female activity and requires neither an ownership of land nor a large amount of start-up capital. Little is known to fill this gap. The study has sought to answer four central questions: What are the effects of ethnic and religious diversities on the performance of female workgroups in the red-pepper processing in Ethiopia? How does intra-group trust and monitoring relate to each other, and how this relation

affects workgroup performance? Is there a difference in the individual versus group risk choices, and whether these choices affect workgroup performance? Whether and to what extent that women's income generated from these workgroups is translated into their empowerment?

To address these questions, we collected data from 508 women, who are members' of 102 female workgroups in the red pepper and other spices processing in Addis Ababa. Data were collected by means of field experiments and survey methods.

In the following section, we first summarize the main findings and thus the central research questions will be answered. After which, we discuss the contributions made to the literature, and then, we describe the policy implications. Following, we present the limitations of this study, and finally, we set our concluding thoughts.



*In the last two decades, the Ethiopian government and developmental organizations supported women in terms of providing working places, business training, finances management, market integration, micro-finance and so forth.*

## **Ethnic and religious diversities and workgroup performance**

(Chapter Two). This study revealed significant effects of ethnic and religious diversities on workgroup performance. The significance of these variables can be explained by their importance in the social context of the study area—in Ethiopia, ethnicity and religion are the two important identities in which people identify themselves, fight for and die. We thus argue that the effect of diversity on workgroup performance is determined by the importance of the characteristics from which the diversity variables are derived. The importance of each characteristic should be examined in relation to the social context of the study area.



*In Ethiopia, women have a comparative advantage in the processing activity of the red-pepper value chain.*

More importantly, the results show opposite effects of these two diversity variables on workgroup performance, with ethnic diversity being negatively and religious diversity being positively related to performance. We argue that these opposite effects can be explained by two major differences on the nature of ethnicity and of religion. The first difference is related to whether or not the identity can be changed over time, and the second difference is related to absolute truths in religion and hierarchical beliefs in ethnicity (see Chapter two). These differences in turn may result intra-

group religious competition and intra-group ethnic conflict.

## **Intra-group trust, monitoring and workgroup performance**

(Chapter Three). This study indicates that intra-group trust had a positive and significant relation with monitoring; it also mediates the positive relation between monitoring and performance. This study also finds a direct and positive relation between intra-group trust and performance.. This study finds that workgroups whose members were better able to monitor one another perform better. The literature shows both costs and benefits of intra-group monitoring on group performance (see Chapter Three).

## **Individual versus group risk choices and workgroup performance**

(Chapter Four). This study finds the dominance of cautious choices both in the individual and group conditions. The study also indicates a positive and significant relation between group risk choices and performance. This finding is in line with studies used data from Western countries (Wang & Poutziouris, 2010; Rachdi & Ben-Ameur, 2011). This study underlines on the importance of individual risk choices, which in turn may affect the group risk choices and performance.

## **The multidimensional nature of women's empowerment**

(Chapter Five). This study makes clear that the economic dimension of women's empowerment is not strongly related to five other dimensions of empowerment (familial, legal, psychological, political and socio-cultural).

## **Contributions to the literature**

Given that most of the organizational studies are focused on similar Western male-dominated samples, this study contributes to the literature by providing a unique sample, namely all-female



workgroups in a diversified, low-income and patriarchal social context.

This study also contributes to the literature by providing new empirical evidence on the argument that women's economic empowerment is a necessary, but not a sufficient condition for realizing other forms of empowerment (Chapter Five). It also enriches the empowerment literature by providing evidence on the 'double edge sword' nature of women's economic empowerment in relation to other dimension of empowerment, in which the positive outcomes may counterbalance with the negative. It provides new empirical evidence on the multidimensionality of women's empowerment, in which women can be empowered in one area of life and not in others.

### **Policy implications**

One of the dominant approaches to promote women's empowerment all over the world is through developing female workgroups, which might enable women to act collectively. In the last two decades, the Ethiopian government and developmental organization have also been organizing female workgroups to change the women's conditions in the country. This study provides valuable new insights into the role of diversity, intra-group trust and risk choices for developing effective workgroups in patriarchal and low-income social context in general, and in particularly in Ethiopia.

The results of our study clearly show the dominance of risk-averse behavior both in the individual and group risk choices, and the high risk-aversion was also associated with lower workgroup performance. Moreover, the results confirm the importance of examining individual risk choices in order to determine how they would behave in the group condition.

Our findings on the multidimensionality of women's empowerment might have important implications in terms of evaluating the success of 'income focused' interventions in terms of outstretching in other dimensions as well and in terms of developing interventions aimed at empowering women in all dimensions. We thus argue that governments and developmental organization promote women's empowerment should understand the multidimensionality of women's empowerment. Empowering women economically does not necessarily mean empowerments in other dimensions as well, and thus each dimension of empowerment may require specific attention in order to achieve improvement in it.

### **Limitations**

In general, our study is limited by its focus on female workgroups in the spices processing sector and by small size of our sample. The procedures used in the lottery choice experiment might also set certain limits on our findings. Another potential limitation can be found on measurement of women's empowerment, which is used for one point in time, whereas the underlying processes are dynamic in character. It may take years before an improvement in one dimension of empowerment (e.g. the economic dimension) has spread towards other fields of life and leads to improvements in the other empowerment dimensions. However, most of women groups in our study were already active for prolonged periods of time. This means that the increase of the women's income due to their participating in the group business has had some time to spread to other fields of life. The fact that we found only weak correlations thus indicates that an effect of income on the other empowerment dimensions -- if it exists -- is in any case not very strong.



*Red pepper is a spice and vegetable crop produced by many farmers in Ethiopia. In the daily diet of most Ethiopians, its average daily consumption is higher than that of tomatoes and of many other vegetables.*

## Concluding thoughts

This thesis identified important factors affect the performance of female workgroups, which is also the main element of women's economic empowerment, in patriarchal and low-income social setup.

Thus, this study may be a pioneer in terms of introducing this unique social context for the literature of organizational behavior. It also provides empirical evidence on that economic empowerment is a necessary but not a sufficient condition to achieve other forms of empowerment. This study may provide important guidance for governments and developmental organizations promote women's empowerment through formation of female workgroups in all over the world.

## Transformation of downstream dairy supply chains in Ethiopia: retail outlets, product upgrading and consumer preferences

By Alemayehu Dekeba Bekele



On September 30, 2016 Alemayehu Dekeba Bekele had his successful Public Defense of the PhD thesis in Nijmegen.

### What influences the expansion and adoption of modern retail outlets in the dairy sector?

Chapter 2 provides evidence about the trends in the expansion and adoption of modern retail outlets in the semi-processed (dairy) food sector. We observed that traditional retail outlets are superior dairy retailers because they offer competitive advantages in several dimensions: proximity to households, lower prices, and higher perceived quality of dairy products. In contrast, modern retail outlets have the advantage of ensuring the safety of dairy products. Furthermore, modern retail outlets tend to

attract affluent households in society, but they offer limited convenience partly because of their concentration in a few affluent areas. Despite this, the penetration of modern retailers into the dairy sector has implications for both consumers and smallholder farmers. In the initial phase of supermarket expansion in Africa/Ethiopia, consumers will be disadvantaged because of the higher prices of dairy products. On the other hand, the expansion of modern retailers impairs smallholder farmers' livelihoods because a large proportion of unprocessed milk (close to 91%) is still channeled through traditional retailers. The results further show that the market division between modern and traditional retail outlets appears to cater for different consumer segments.

This segmentation appears to be heterogeneous, and modern affluent consumers shop from both modern and traditional retailers. Gradually, modern retailers are expected to further penetrate into the agri-food market, but this may also lead to tensions with traditional retail formats. Such tensions are expected to limit access to dairy products for poor consumers and could lead to the potential exclusion of smallholder farmers from access to these market opportunities. We observed that specialized stores (dairy shops) appear to fill the gap between the two retail formats. These dairy shops are emerging as an important retail alternative in the dairy system.

### **How do health information and sensory characteristics influence the choice of dairy products?**

Chapter 3 discusses evidence regarding the impact of health information and sensory attributes on fluid milk consumption (raw and pasteurized milk). It shows that the impact of information and sensory attributes is mixed. The majority of consumers are willing to upgrade to pasteurized milk, but there is heterogeneity in consumer preference: more educated people are more willing to upgrade and to pay a quality premium. To a great extent, intrinsic milk quality attributes are more valued than extrinsic quality attributes – labelling, information, and production processes. These results show that sensory attributes are much appreciated product attributes, and consumers have a lower propensity to substitute these for credence attributes.

Additionally, consumer preference regarding the use of information in purchase decisions shows that health information plays a significant role in inducing consumers to upgrade towards higher quality products. Nevertheless, the effect may be underestimated because of consumers' prior knowledge with regard to

the health risk of consuming raw milk. This relates partly to the practice of boiling milk before consumption – a locally accepted safety measure that overshadows the impact of information on the purchase of pasteurized milk. Moreover, we found that trust in the milk retailer plays an important role in overcoming the information problem that consumers face in making the decision to purchase. Because of the widespread information asymmetry in the dairy market, targeted information provision may facilitate optimal purchase decisions by consumers.

### **Does nutrition information labeling matter in milk purchase behavior?**

Chapter 4 examined how nutrition information labelling and sensory attributes influence consumers' choice behavior and their willingness to upgrade consumption to nutritionally diversified products. The results indicated that consumers put a lower value on nutritionally improved milk products, mainly fat-modified milk products. Despite a lower demand for these products, the results show that there is a niche market. To exploit this option, it appears that there is a price premium for nutrition information labelling that could be capitalized. Here, information labelling has an effect in increasing the acceptance of fat-modified milk products, but the effect varies across consumer groups, with more educated consumers willing to pay more for additional nutrition information labels. However, it is important to understand that sensory attributes remain an important hurdle for upgrading to new foodstuffs. In Ethiopia, consumption of processed products is generally associated with bland taste, and this preference might not change, even in the presence of nutrition information labelling. An improvement in sensory experience of the product is an important base for increasing the future acceptance of fat-



modified milk products. In addition, the demand for these products appears to be segmented across milk markets, implying the need for more varied approaches in each market.

## **How do sociocultural and household factors influence dairy consumption behavior?**

Chapter 5 analyzed the determinants of households' dairy consumption decisions and how these differ across products and decision stages. We focused on unravelling economic and sociocultural determinants of dairy consumption decisions. Our study shows that dairy consumption is rising and that this is driven by the rise of young and more educated consumers. Educated women and those that have maids appear to increase milk consumption at household level. We also found that income appears to boost the consumption of dairy products, although it has limited effects in convincing non-consumers to start buying

milk. It appears that price is rather inelastic for milk products, and this provides a possibility for changing consumption levels through information exchange, as price has little effect on convincing non-consumer to buy milk. Also, modern retail outlets appear to have limited effects on milk consumption although they have a positive effect on butter sales.

Apart from this, sociocultural factors remain important in shaping milk consumption. For instance, fasting, which is common in large parts of Ethiopia, appears to have a limited effect on reducing butter consumption but a large and significant one on milk consumption. Adding to the existing literature, we found that both non-economic and economic factors are important in influencing dairy consumption. However, the effect varies across dairy product attributes and stages of purchase decisions (propensity to purchase and volume of purchase).

## **Collective action and endogenous preferences of smallholder farmers in Ethiopia**

**By Molla Alemayehu Yismaw**



### **What is the result of your study?**

I did not graduate because I am waiting at least two of my papers are getting published.

Otherwise, I finished the whole thesis getting prepared.

### **Why did you choose this topic?**

I chose this topic because endogenous preferences are the engines of poverty in developing countries like Ethiopia, which has a salient impact on the commercialization smallholder farmers agriculture. Farmers' preferences for risk and time can be changed and evolved overtime, and hence interventions are needed to affect these preferences and

pave the way to get farmers out of preference induced poverty trap.



*Potatoes in bloom.*

**What is your experience as a student?**

I had a very good experience as a student with the Nuffic project. I acquired very good academic and environmental lessons. I got important lessons on how to do experiments in economics discipline, how to write a sound proposal and how to write scientific papers besides other peer relation with other foreign students and academic staffs.

**What is your ambition for the future?**

My ambition in the future is to extend my experience that I got from the scholarship and find ways to apply in commercializing Ethiopian agriculture.



*Cabbage field.*

**What is the most striking difference between the Netherlands and Ethiopia?**

The most striking difference between Netherlands and Ethiopia is the work culture difference that I have seen. In the Netherlands, people are very committed to accomplish their job effectively and efficiently within the prescribed time frame. In Ethiopia the work culture is very poor, inefficient and ineffective, and people do not regret whether they accomplish it effectively and efficiently or not.

**Which major challenges in Agribusiness must be done on short-term (1year) in Ethiopia? And on medium (5 year) and long-term (20-25 year)?**

Awareness creation for the upper stream chain actors about product handling, sorting and grading should be worked in the short-term. Infrastructure development that helps to facilitate factor and product marketing can be done in the medium term. Making chain governance and chain financing to be fair and balanced should be done in the long-run.

# NEWSLETTER

Supporting the development of Commercial  
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