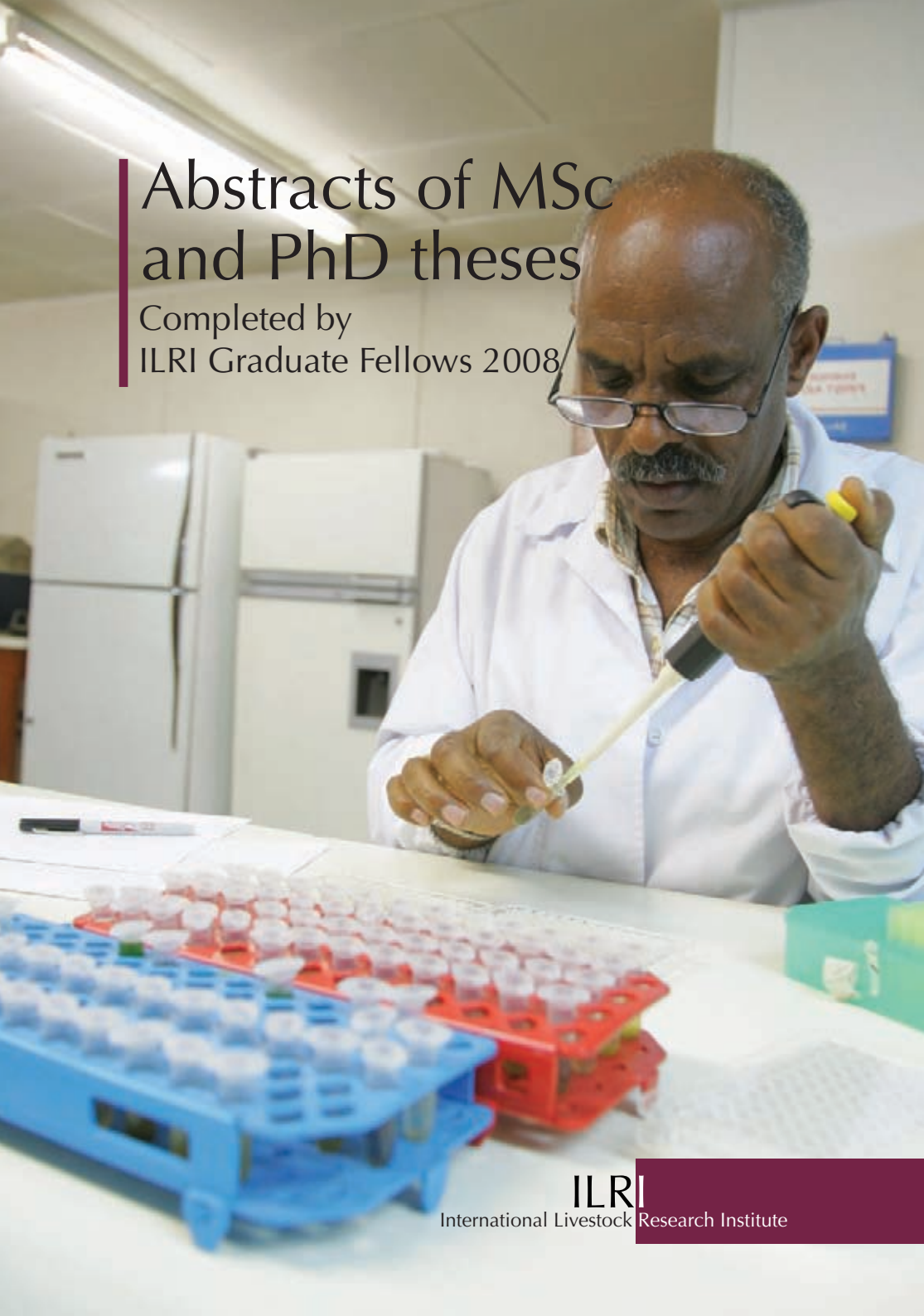# Abstracts of MSc and PhD theses

Completed by
ILRI Graduate Fellows 2008

ILRI
International Livestock Research Institute

Abstracts of PhD and MSc theses completed by ILRI Graduate Fellows

2008

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This paper is a compilation of abstracts of PhD and MSc theses by ILRI Graduate Fellows during 2008.

Introduction

The International Livestock Research Institute (ILRI) is one of 15 future harvest centres, which conduct food and environmental research to help alleviate poverty and increase food security while protecting the natural resource base. Building on three decades of experience, ILRI works at the crossroads of livestock and poverty by bringing high quality science and capacity building to bear on poverty reduction and sustainable development. As part of its research-based outreach and capacity strengthening, ILRI assists its partners by offering opportunities for long- and short-term training for researchers and development practitioners. Capacity building is a core priority of ILRI because of the important role it plays in economic growth and development as well as addressing the rapid changes in the bio-physical, socio-cultural, technological and policy environments of the agricultural innovation systems in the developing as well as the developed world.

ILRI offers individual and group training courses. Both are aimed at largely building the capacity of the individual. Individual training is focused on harnessing the skills and abilities of individuals to contribute to the realization of developmental goals, which may include improved livestock management systems and enhanced research outputs and outcomes. ILRI has five categories of individual trainees: Attachment Associates, Student Associates, Technical Associates, Research Fellows and Graduate Fellows.

Graduate Fellows are mostly employees undertaking MSc and PhD studies. Postgraduate training is a priority activity of ILRI as it contributes significantly to the research agenda of ILRI and to the national and regional human resource pool in many regions of the world. This group of graduates will continue the research on emerging issues and will form the core of future collaborative research and innovation partners of ILRI.

ILRI supports a number of Graduate Fellows every year. The outputs of their work would end up as thesis and various publications. Not every researcher, however, has access to these materials. The result of the research efforts of the Graduate Fellows have limited impact due to lack of wider circulation of their findings. This publication of the abstracts of the thesis work supported

by ILRI as a compendium is one way to make sure that the results are widely distributed among the various research and development practitioners working within the livestock innovation system.

The purpose is to make the R&D community to be aware of the research work completed and the key findings. If you need additional information, please contact ILRI's InfoCentre directly where copies of these theses are deposited. We sincerely hope that this document will contribute positively in planning the future research activities and also will eliminate potential duplication of efforts.

P Anandajayasekeram
Manager, Capacity Strengthening Unit
ILRI

Abstracts of PhD theses completed by ILRI Graduate Fellows

2008

The presence, position and effects of quantitative trait loci (QTL) for trypanotolerance in a (N'Dama x Boran) x Boran backcross under natural tsetse fly challenge, in relation to genetic improvement of trypanotolerance in East African cattle

Caleb Orenge
University of Nairobi, Kenya

Abstract: Use of trypanotolerance may offer a viable control option to African animal trypanosomosis. Recent studies identified trypanotolerant quantitative trait loci (QTL) in an F2 cattle population under artificial challenge. To find out if these trypanotolerant QTLs offers useful trypanotolerance under natural tsetse and trypanosomosis challenge in the field, a QTL challenge and mapping experiment was designed involving a backcross (BC1) of (N'Dama × Kenyan-Boran) × Kenyan-Boran. 192 BC1 were bred in Kapiti, weaned at 9 months and taken to Narok for challenge. Together with 37F1s, 25 Kenyan Boran and 22 Orma Borans, they were monitored for various aspects of trypanotolerance for a period of one year. The BC1 (192) together with 13 F1 sires and 8 founders of 4 Kenyan Boran females and 4 N'Dama males were screened across 5 chromosomes using 35 highly polymorphic microsatellite markers. A single trait QTL model, within the framework of multiple interval mapping (MIM) of MultiQTL was implemented for 28 defined traits. Results revealed superior trypanotolerance of the N'Dama, intermediate inheritance for trypanotolerance, with a tendency for recessiveness of the trypanotolerance alleles and six significant QTLs affecting the five target chromosomes. One QTL derived its higher trypanotolerance from the Boran breed, a result confirming previous findings. It is concluded that this BC1 may be more trypanotolerant than K-Boran while retaining the productivity characteristics of the K-Boran and that the level of trypanotolerance among backcross animals is highest among those retaining N'Dama genetic background at the selected QTL. The results point to the possibility for the development of a productive and trypanotolerant synthetic breed through marker assisted breeding.

Economic valuation of the preferred traits of indigenous cattle in Ethiopia

Girma Tesfahun
Goettingen University, Germany

Summary: Valuation of the characteristic of indigenous livestock populations serves a number of purposes. These include clear understanding and appreciation of the multi-functionality of the animals, identification of the most preferred traits for conservation and breeding purposes, understanding of the marketing system, and transformation of the livestock production system. The rural communities in developing countries keep livestock for a number of direct (e.g. consumables, traction, prestige, security) and indirect (e.g. complementarities with crop production and natural resources) uses and objectives. Virtually no attention was given for this intricacy in the objectives of traditional livestock keeping while enormous resources were allocated to introduce livestock breeds with very specialized traits developed for high production systems to developing countries.

If countries like Ethiopia are to benefit from the livestock wealth they are endowed with, a well-informed livestock conservation strategy need to be formulated based on comprehensive inventory of the generic resources and proper valuation of their traits or characteristics which explain the reasons why they are kept for. Only two documented efforts by Zander (2006) and Ouma et al. (2007) were made to elicit preferences and estimate relative values of traits in the pastoral areas of Southern Ethiopia. Yet, no attempt has been made to do the same in the most dominant crop–livestock mixed production systems of the country.

This research aims at filling this gap by focusing on the cattle population in central Ethiopia. The research has characterized the livestock production system, discussed the theoretical and empirical importance of economic valuation of traits, valued traits of cows and bulls using both stated and revealed preference approaches and suggested a community based management (CBM) framework for conservation and sustainable use of animal generic resources (AnGR).

Small animal production in central highlands of Ethiopia: Case study in East Shewa Zone, Ada'a Liben *woreda*

Yoseph Shiferaw
Humboldt University, Berlin, Germany

Abstract: This study examined smallholder small animal (chickens, sheep and goats) production systems and their roles in the livelihood of subsistence resource poor producers in rural and urban areas of central Ethiopia. Longitudinal cohort study design method was used to capture herd composition and dynamics, husbandry practices and inputs and outputs.

Household samples kept on average 5.4 chickens, 2.25 goats and 2.56 sheep. Nearly 85% of sample households with small animals kept two or all three species of animals, all non-descriptive local types. The average incidence rate of chickens entering the flock through hatching and purchase were 88 and 4.5 %, respectively. The average mortality incidence rate of adult chickens was 13.64% and chicks 36.92 %. For sheep and goats the respective average incidence rates of birth were 59 and 61 % and mortality were 1.73 and 1.13 %. There was no difference between urban and rural locations on the incidence rates. Households practiced a low-input extensive system, spending Birr 15 (USD 1.8) per year in rural and Birr 25 (USD 2.8) per year in urban area on purchased feed, mainly concentrate.

Sample households (22%) realized on average gross income receipts of Birr 12 (USD 1.38) or per capita Birr 2 (USD 0.25) per two months from the sales of eggs and no location difference over the realized income. Besides, rural households (10%) realized on average gross income receipts of Birr 28 (USD 3.28) or per capita Birr 5 (USD 0.6) per two months from the sales of chickens. Also, 26 and 62 percents of households were able to realize gross income totalling Birr 185 (USD 21.3) (per capita, Birr 30 (USD 3.5)) and Birr 108 (USD 12.5) (per capita, Birr 20 (USD 2.5)) per year from the sales of sheep and goats, respectively. Location differences on the realized income from sales of sheep and goats were not detected. Nearly 36% of households consumed on average a single chicken per two months; again, statistically, no difference

existed between the two locations over the number of chickens consumed. However, there was a significant difference on the number of eggs consumed, on average 18 and 24 eggs per two months were consumed by rural and urban households, respectively.

The findings of the present study showed, keeping few numbers of small animals under the low-input uncontrolled subsistence system had a diminutive contribution to the livelihoods of resource-poor communities in the central highlands of Ethiopia. This calls for an improvement of production practices from traditional low input small scale subsistence to an increasingly market-oriented medium scale self-reinforcing system. However, to achieve that efficient and sustainable integrated production improvement programs, supported by enabling policy with strategic consideration of resource poor societies, are required.

Abstracts of MSc theses completed by ILRI Graduate Fellows

2008

Analysis of the role of cooperatives in agricultural input and output marketing in Southern Tigray

Alema Woldemariam
Mekelle University, Ethiopia

Abstract: When the issue of economic growth and development of the country is raised, one has to take into account the performance of the growth of smallholder farmers. Reducing the challenges they are facing and utilizing their potentials can help to accelerate the agricultural sector and economic development of the country as a whole. Agricultural cooperatives are ideal means for self-reliance, higher productivity and promotion of agricultural development. Therefore, the major concern of this study is empirically analysing the role of agricultural multipurpose cooperatives found in the Southern Zone of Tigray Region of Ethiopia. From the five *woredas* of the Southern Zone of Tigray Region Alamata and Ofla *woredas* were selected at random for the study.

Both primary and secondary data were taken for this study. A three-stage random sampling procedure was adopted to select 10 primary agricultural multipurpose cooperatives and a total of 208 sample respondents at the rate of 56 from Alamata and 152 from Ofla *woreda*. Primary data pertaining to the year 2006/7 was collected from the selected sample respondents by using a through structured interview schedule. Of the total respondents, about 70.209% and 29.80% were participants and non-participants of the cooperatives agricultural input and output marketing respectively. Secondary data of cooperatives was also taken in to consideration to examine the performance of the input and output marketing by the cooperatives in the Alamata and Ofla *woreda*. Financial ratios were analysed taking the two audit year's financial data. The liquidity analysis showed that the cooperatives under investigation were below the satisfactory rate (current ratio of less than 2.00). The financial leverage ratio (debt ratio) showed that the cooperatives under investigation used financial leverage (financed more of their total asset with creditors' fund). The profitability ratio of the cooperatives showed that the profitability of most cooperatives improved when we compare from the first audit year to the second audit year, except two cooperatives in Ofla *woreda*

(Tadesech from 25.9% in 2004 to negative 1.6% in 2007 and Higumberda from 40.8% in 2002 to negative 5.2% in 2003).

Descriptive statistics were used to compare the explanatory variables of the participant and non-participant sample respondents in the agricultural input and output marketing. Testing differences between two samples were done using T-test and Chi-square test. The comparison revealed that there is a significant difference between the two groups of sample farmers regarding their age, education livestock ownership in TLU, shareholding, non-farm income, expenditure on agricultural input, distance of the cooperative office from the farmer member's house, membership of the household head in other cooperatives and price of improved seed. Probit econometric model was employed to identify the factors influencing the participation of cooperative members in the input and output marketing by cooperatives in the two *woreda*. Fifteen explanatory variables were included in the model of which ten variables were found to be significant. Of these, six explanatory variables namely own land, shareholding ,distance, output price, membership in other cooperatives and seed price) were found to be significantly and positively related to the participation of cooperative members in the agricultural input and output marketing by cooperatives. Hence, it is suggested that more attention is to be given to the human resource development of the cooperative auditors through short term and long training programs so that to able to undertake timely audit of the cooperatives both in terms of quality and quantity. This implies, cooperatives can pay the patronage and capital dividend to members and minimize financial embezzlements through strong internal control system. Moreover, professional management is becoming crucial issue for the cooperative societies in order to run viable and profitable business that can meet members benefit. Therefore, due attention is required for the recruitment of professional managers.

Comparative study on the performance of dairy cooperative input and output marketing in Atsbi Womberta, Alamata and Enderta *woredas* in north Ethiopia

Almaz Mesfin
Mekelle University, Ethiopia

Abstract: Cooperative form of business is an instrument of change with the task of making the poor productive. The development of dairy cooperatives in Ethiopia indicates that there is a need to focus interventions more coherently addressing both technological gaps and marketing problems. The present study investigates the difference in performance of cooperatives in the study area and major factors influencing performance.

The objectives of the study were: 1)to compare the performance of selected dairy cooperatives in Enderta, Alamata and Atsbi Womberta *woredas* of Tigray. 2) To assess the determinants of performance among the dairy cooperatives. 3) To identify the constraints with respect to quality feed and breed and finally to suggest suitable strategies to improve the productivity and marketing capabilities in the selected *woredas*.

The researcher used focus group discussion, report from government offices as secondary data and enumerator administered interview schedule for data collection. The study areas Alamata, Enderta and Atsbi were selected because of the existence of dairy cooperatives with good potential and a felt need to study their performance. All cooperatives except one were included in the study and a random sample of 120 respondents was selected based on the probability proportionate to size. The data was analysed using SPSS version 13.0and statistical tools such as descriptive statistics and regression. The results are presented as frequencies, percentages, chi-square and financial ratios. The large majority of the respondents were married female farmers in the productive age group of 15-35 years with the maximum education attended being primary school.

The impact of independent variables on the satisfaction of members, the main indicator of performance shows that cooperatives age; members' training; availability of credit; members' participation and gender had positive impact on the performance of cooperatives and lack of roads had negative influence. The rest of the independent variables showed association but had no statistical significance. The most important constraints regarding feed perceived by members were non-availability and high price of feed where as regarding breed there were lack of breed and insemination centres.

In conclusion, there is difference in performance among cooperatives brought about by variety of challenges. It is recommended that cooperatives have training and supportive supervision by experts and officials to improve their productivity and managerial capabilities. Due attention should be given to the development of roads and transport system as well as the availability of feed and exotic breed. Finally, the researcher recommends broader and indepth research be conducted to discern and properly address the multifaceted problems on dairy cooperatives in *woredas* of Tigray Region.

Effect of nitrogen fertilizer stage of yield and quality of natural pastures in Fogera district, northwestern Ethiopia

Ashagre Abate
Haramaya University, Ethiopia

Abstract: This experiment was carried out to assess botanical composition. DMY and chemical composition of Fogera upland natural pastureland under different application rates of N fertilizers and harvesting stages of natural pasture at small holder farmers' condition. The experiment was conducted using 3 x 4 factorial experiment arranged in a randomized complete block design with three replications and the treatment consisted three stages of harvesting (60, 90 and 120 days) and four levels of N fertilizer application (0, 23, 46 and 69 kg N/ha) on the natural pasture land.

The botanical composition of the natural pastureland that has been identified at the experimental site included thirteen grasses, seven annual legumes and seven other herbaceous species belonging to different families. The influence of stages of harvesting was significant ($P<0.05$) but application of N fertilizers was not significant on total DMY of the pasture. Natural pasture harvested at 120 days of harvesting and at a fertilizer application of 69 kg/ha results the highest DMY (9.97 t/ha) while the lowest level was (5.38 t/ha) from unfertilized plots at 120 days of harvesting. The effect of stage of harvesting and fertilizer level on DMY of legume components was highly significant ($P<0.001$) but for the grass components stage of harvesting had non-significant effect, where as fertilizer had a highly significant effect ($P<0.001$). The relative proportion of legumes in the pastureland reached the highest at 90 days of harvesting at all levels of fertilizer application. The proportion of legumes varied from the highest mean of 56.18% to the lowest of 37.66% at 90 and 120 days of harvesting, respectively while that of grasses ranged from 58.09% to 40.24% at 120 days and 90 days of harvesting, respectively.

The relative proportion of grasses increased with increasing levels of N fertilizers and stage of harvesting up to 120 days. Significant effect of stage of harvesting ($P<0.001$) on CP, NDF, ADF, hemi-cellulose, P and IVDMD were

obtained at levels of fertilizer application. At 60 days of harvesting, highest values of 15.53%, 0.41% and 54.86% were obtained for CP, P and IVDMD, respectively. However, the lowest Values 55.63%, 37.32%, 17.55% and 32.0% were obtained for NDF, ADF, hemi-cellulose and cellulose, respectively at the same stage of harvesting. The CP content was significantly (P<0.001) lower (6.76%) at 120 days of harvesting compared with other stages of harvesting. At all levels of N fertilizer, the mean CP content obtained was above the reported critical level for ruminant's microorganism's functioning (7%). The IVDMD at 90 and 120 day harvesting was 50.09% and 38.76%, respectively. The values at all harvesting stages were below the reported threshold value that ranged between 55 and 70% for medium quality forages from natural pastures.

The results obtained in the present study revealed that fertilizer application increased the yield of natural pasture lands by 36.07%.Fertilizer application at the level of 46kg/ha resulted in higher mean dry matter yield of 9.58 t/ha and higher nutritional quality (11.89% CP, 1.08 t/ha CPY, 49.91% IVDMD and 4.65 t/ha IVDMDY) of the natural pasture. This level of fertilizer application combined with 90 days of (October) harvesting should be practiced for higher pasture yield and quality parameters.

In situ characterization of local chicken eco-type for functional traits and production system in Fogera *woreda*, North Ethiopia

Bogale Kibret
Haramaya University, Ethiopia

Abstract: A study on characterization of local chicken eco-type for functional trait and production system was conducted at Fogera *woreda* of Amhara regional state. Fogera *woreda* is one of the eight *woredas* bordering Lake Tana and it is predominantly classified as woinadega ecology while the annual temperature ranges from 22^0C to 29^0C. The survey report based on 72 house holds having chickens revealed that the flock size range from 1 to 39. The nutritional management practices in the study area were scavenging (main practice) and supplementary feeding. Wells and tap were the major sources of water.

Most of the respondents (59.7%) use separate houses constructed exclusively for poultry. The flock management was without separation of sex or age groups and mating was random and non-seasonal. The prices of live chickens were affected by plumage color, comb type and seasonal demands (holidays and fasting seasons). Disease and shortage of supplementary feeds were the two major production barriers of expanding poultry production. Out of the 100 birds studied, the following plumage color pattern was observed in their respective proportions: complete white (*netch*) (23%) complete black (*tikure*) (7%), complete red (*key*) (39%), white with black or red tips (*netch teterma*) (4%), grayish mixture (*gebsima*) (5%), red with white tips (*key teterma*) (2%), black with white (*tikure teterma*) (2%), white with breast part golden color (*libework*) (8%), multicolor (*anbsema*) (2%), white with red strips (s*eran*) (4%), and red brownish (*kokima*) (4%). In terms of body shape, most of the chicken population observed had a body shape of wedge and a crest (*gutya*) head profile.

Almost all the male chicken had spur while only half of the female chicken had spur. No shank feather was observed both in the male and the female chicken. For mature hens and cocks, the average shank length was 7.25 cm

and 9.32 cm respectively. The average body length was 17.75 cm and 21 cm for female and male respectively.

The ratio cock to hen was found to be 1:3.21. On the other hand, effective population size (Ne) and rate of change in inbreeding coefficient (triangle F) per year were 3.9 and 1.95, respectively. The monitoring data revealed that average number of eggs laid per cultch per hen was 13.19, while the average number of eggs incubated was 12.97, of chicks weaned was 7.63, the average of hen's age was 19.20 months and average weight of hens was 1.21kg.the performance of egg production characters egg weight, yolk color, yolk weight albumin weight, shell weight and shell thickness were 44.89 m, 9.06, 16.28 gm, 22.13 gm, 5.52 gm, and 0.45 cm respectively. On the other hand, the dressing percentage was found to be 58.5% for male and 49.38% for female. All these findings indicated that the local eco-type, despite the relatively high temperature (30°C) and the swampy (wet land) Forgera Plain have good potential for egg and meat production. Thus, they could be used in other places with similar weather and environmental conditions.

Analysis of cotton marketing chains: The case of Metema *woreda*, North Gondar, Amhara Region

Bosena Tegege
Haramaya University, Ethiopia

Abstract: In this study, factors affecting farm level marketable supply of cotton were analysed using robust OLS regression analysis. The results obtained from this analysis indicated that number of oxen owned by household, land allocated for cotton in hectare, the productivity of cotton per hectare, and access to credit for cotton significant factors affecting farm level cotton marketable supply. In order to evaluate the efficiency of cotton market chain that can have great influence on farm level marketable supply of cotton, structure-conduct-performance approach was adopted. Market concentration ratio (CR4) at District level was found to be 49.76 percent and there were observed barriers to enter into cotton market. These structural characteristics indicate oligopolistic structure of cotton market at District level. The study suggested that cotton market at ginneries and textile factories level is highly oligopolized by two ginneries and three textile factories. Buying, selling, and pricing strategies, which are indicators of market conduct showed deviation of cotton market from competitive market norms. Performance of cotton market chain was analysed using Marketing Margins supplemented with analysis of costs incurred and gross profits generated for different market chain actors. The analysis showed poor performance of the chain in that farmers were the most disadvantaged chain actors, and assemblers and ginneries were better-remunerated ones. The major constraints and opportunities in cotton marketing in the chain were also identified. Based on the study, policy interventions required to increase farm level marketable supply of cotton are suggested and forwarded.

Estimating the prevalence of game meat utilization in commercial outlets in Nairobi using mitochondrial DNA sequences

Brian Karisa
University of Nairobi, Kenya

Abstract: Meat quality has always been assessed in relation to compositional quality such as lean to fat ratio, and palatability factors such as tenderness, juiciness, appearance and flavor. However, the species of origin of meat is an important factor in assessing meat quality due to economic, public health, biodiversity conservation, cultural and religious restrictions.

Consumption of meat from wildlife, so called bushmeat, is gaining popularity because it offers cheaper alternative sources of protein to the food-poor families. However in Kenya such utilization is outlawed by The Wildlife Conservation and Management Act (Cap 376). Further, such illegal utilization also increases revenue for retailers who sell it to unsuspecting customers. However, bushmeat consumption compromises wildlife conservation efforts and may result in common species becoming rare and endangered species becoming threatened with extinction.

One of the objectives of this study was to estimate the prevalence of bushmeat consumption in Nairobi. We randomly obtained 556 raw meat samples from butcheries in and around Nairobi and homologous cytochrome b (Cyt b) nucleotide sequences were generated from purified PCR amplicons. Controls (meat samples from known species) were integrated into the assay and included wildlife species (Grant's gazelle, eland, impala, African buffalo, zebra, waterbuck, cheetah, lion) and domestic species (cattle, sheep, pig). The species origin of the Cyt b sequences was determined by homology searches of the GenBank® nr sequence database using BLAST.

The results revealed that all the meat samples were of domestic origin and not of wildlife origin. However, there were high levels of substitution between chevon and mutton. While very high levels of wildlife poaching and consumption of bushmeat is known to occur in Kenya, these results indicate that the meat is not being sold through the outlets sampled in this study. Other

outlets and alternative routes to market (e.g. sale of cooked meats or of meat admixtures (mincemeat), or even sale through rural outlets) should therefore be the focus of future bushmeat identification and control activities.

Additionally, a technique was developed based on multiplex PCR using species-specific Cyt b gene primers to detect meat that contained admixtures of domestic and wildlife species. The PCR primers were designed not only to be species-specific, but also designed to generate amplicons with different sizes for each species, thereby allowing easy identification by agarose gel electrophoresis. Preliminary laboratory validation of the species-specific PCR assay was completed and showed that the assay is able to differentiate between cattle, goat, sheep, pig, donkey, eland, zebra, buffalo, wildebeest and Grant's gazelle. This multiplex assay, together with the Cyt b PCR/sequencing assay described above, could become important tools for wildlife, conservation and law enforcement agencies.

Access and utilization of agricultural information by resettler farming households: The case of Metema *woreda*, North Gondar, Ethiopia

Daniel Tadesse
Haramaya University, Ethiopia

Abstract: The Government of Ethiopia has been implementing a resettlement program in Metema *woreda* in Amhara region since 2003. Previously in the Derge Regime, another resettlement program has been implemented in 1985 and voluntary settlers were in-migrating even before that. Extension service is mandated to assist them in order to improve the production and productivity of the farmers, enabling them to achieve food security and income generation. This study is aimed at assessing the new and previous settler farmers' access to and utilization of agricultural information from the extension service and as well as to identify the influencing factors. A two stage random sampling technique was employed and in the first stage of sampling, three PAs were selected purposively and the respondents were stratified into new and previous settler categories. In the second stage, probability proportional to size sampling technique was applied to each stratum. Finally, 160 sample respondents were selected using simple random sampling technique and interviewed using pre-tested structured interview schedule. Fifteen percent of respondents were female headed households. Both primary and secondary data were collected and analysed to understand various aspects of access and utilization of agricultural information of farmers. Qualitative data were used to supplement quantitative data. Data were analysed using descriptive analysis and Tobit model. Except from seasonal extension orientation and mass media, in all cases there was significant difference between new and previous settlers' access to and utilization of agricultural information. In all extension methods, there were highly significant differences between male and female headed households in obtaining agricultural information, in the favor of males. The female headed respondents utilized the obtained information with comparable to male headed households. The agricultural information and support for utilization provided by the extension service were biased towards the previous settlers and males, and consequently the new settler farmers' and female headed households' agricultural information

access and utilization was very limited. The survey finding reveals that the current extension service has limited responsiveness, gender sensitivity and poor potential of addressing farmers' need. In the absence of responsive extension service that understands and addresses interests of various groups of farmers, the purpose of resettlement program would not be fulfilled. Result of the econometric model indicated that, settlement category, education level, settlement orientation, innovation proneness, production motivation, age of household head, frequency of market visiting and credit access had influence on the access to and utilization of agricultural information. The overall finding of the study underlined the importance of well organized agricultural information provision and supporting utilization of information through the delivery of credit and technologies based on the farmers' problem and need. Institutionalized and genuine resettlement program information provision in the highland also required. Therefore, policy and development interventions should give emphasis to improvement of such institutional support system so as to enhance the production and productivity of agriculture and to achieve the desired poverty reduction strategy in the resettlement program.

Beef cattle production system and opportunities for market orientation in southern Borena

Daniel Tewodros
Haramaya University, Ethiopia

Abstract: This study attempted to investigate the beef cattle production system and opportunities for market orientation in southern Ethiopia, Borena Zone. The specific objectives of the study were to characterize cattle production systems, assessment of marketing systems, assess seasonality of domestic cattle meat consumption; and assess potentials and constraints of export abattoirs in Ethiopia. To achieve these objectives, secondary and primary data were used. Export abattoirs, producers, and butcheries interview were sources of primary data. Export abattoirs survey was undertaken on ELFORA Agro-Industries PLC and LUNA export slaughter house PLC. Producers' survey was done the pastoral areas of Borena Zone of Oromia Regional State in three Pastoral Associations (PAs) and these were Surupha, Dida Yabello and Dubluk. Producers from each PA were selected using Proportional Probability to Size (PPS) approach for each PA. A total of 150 producers were selected based on the number of households in the PAs. To see the marketing system, four markets were covered from Borena pastoral area (Surupha, Haro Beke, Yabelo, and Dubluk). Butcheries survey was done on the purposively selected areas and these were Kara, Sululta, Dukem and Burayu. Butchery's from each direction of Addis Ababa were selected using Proportional Probability to Size (PPS). A total of 50 butcheries were selected based on their availability in each of the four areas. To see the seasonality of cattle meat consumption, slaughterhouses which give services to the respective butcheries were covered. According to results of the study, 52.7% of the herd owners keep beef cattle to generate cash income and farming purposes. The major feed resources for 147 (98.6%) of the respondents rely on grass from grazing as a basal feed for their cattle, out of which 54 (36.2%) of them used salt as a supplement. Deep wells are the major sources of water in the study areas. According to the sample households the constraints to cattle production system were shortage of grazing land, water, disease, lack of technical supports, lack of security, labor shortage and conflict. Regarding the market information sources, the majority of the respondents 138 (92%), got market information before they went out

to sell their cattle. However, the major sources of market information in the study area were informal. Technical supports on cattle marketing issues were obtained from development/extension agents. For 63.3% of the respondents, the determination of the price at the market places were through negotiation between the sellers/producers and the buyers. About 33% (N=149) of the respondents stated that cattle prices increase during the rainy (wet) seasons, mostly from July to August. The major reasons for the cattle price variation across months/seasons as stated by 114 (76.5 %) of the respondents were the seasonal feed and water availability. The major countries that import beef from Ethiopia are Yemen, Egypt, Congo Brazzaville and Cote D'Ivoire, and the export of beef cattle were either in the form of live or processed meat (chilled or frozen carcass). Thus breed, sex, age, weight and sometimes color of the animal for the live export are the major criteria considered by the live animal exporters and export abattoirs during purchase. The major constraints of the export abattoirs were frequent occurrence of livestock diseases, feed and water shortage along export trade routes, market intelligence and transportation. About 84% of the butcheries purchase beef cattle for slaughtering and retailing meat in their butchers. On average, carcass weight of 143.33 ± 5.27 (Mean $\pm$ SE) kilogram per head was reported by butcheries, the selling price of a kilogram of beef was 19.36 ± 0.423 ETB (Mean $\pm$ SE). However, the price of meat were significantly ($P \leq 0.05$) higher 26.00 ± 2.041 (Mean $\pm$ SE) at Dukem and cattle meat yield were significantly ($P \leq 0.05$) higher 164.00 ± 8.95 (Mean $\pm$ SE) at Kara as compared to the other locations. The low demand periods for cattle meat correspond with the period of religious fasting periods by the Ethiopian Orthodox Church followers, the slaughter houses cease or minimize their services due to the fact that butcheries stop ordering cattle slaughter services. The constraints of the butcheries were high tax rates, slaughterhouses problems, high price of cattle at the markets and the illegal backyard slaughtering practices. The overall finding of the study underlined the high importance of institutional support in the areas of market oriented cattle production system, market extension, animal health services and range development in the pastoral area, development of export abattoirs facilities, reducing multiple taxes. Therefore, development interventions should give emphasis to improvement of such institutional support system between exporters, butchers and producers, so as to achieve income to these market actors.

Detection and determination of oxytetracycline and Penicillin gantibiotic residue levels in bovine bulk milk from Debre Zeit and Nazareth dairy farms

Desalegn Abebaw
Addis Ababa University, Ethiopia

Abstract: A cross-sectional study was conducted between October 2007and May 2008 to detect and determine Oxytetracycline and penicillin G residue levels in bulk milk of cows in Debre Zeit and Nazareth dairy farms. A total of 400 bulk milk samples were randomly collected in the respective study dairy farms. A questionnaire survey was carried out by personal interviews with dairy farm owners in Devlotest positive farms (cases) and Devlotest negative farms (controls) to identify various risk factors and to determine associations among the occurrence of antibiotic residue in milk.

All Samples were qualitatively screened for antibiotic residues by devlotest SP assay. Concentration of the positive samples was determined by high performance liquid chromatography. Concentration was established by using linear calibration reference curves. Out of 400 samples analysed for antibiotics residue, 46 (11.50%) had detectable antibiotic residues. In Debre Zeit dairy farms, 34 (12.19%) and in Nazareth, 12 (9.90%) milk samples were positive antibiotic residues.

The mean residue level of oxytetracycline was 142.00 ug/I and 125.25ug/I in Debre Zeit and Nazareth dairy farms and that of penicillin G was 4.77ug/I and 4.52ug/I in the dairy farms ,respectively. Oxytetracycline concentrations in all samples in Debre Zeit Nazareth dairy farms ranged at a concentration between 27-251ug/I and 45-192ug/I, respectively. The antibiotic residue positive samples which showed residues of oxytetracycline above the WTO/FAO/CAC established maximum residue limit of 100gu/I were 24 (70.58%) and 10 (83.33%) in Debre Zeit and in Nazareth dairy farms, respectively.

For Penicillin G with maximum residue limit of 4 ug/I, the were 7 (20.58%) and 2 (16.66%) farms, respectively. Penicillin G was found in some milk samples in Debre Zeit (58.8%) and Nazareth (41.7%) dairy farms. The result obtained confirmed that Oxytetracycline and penicillin G were imprudently

used in dairy farms. The results of the present study serve as preliminary baseline information for veterinary authorities, drug administration and quality control, other concerned organizations and professionals to take measures in controlling and preventing occurrences of drug residues.

Assessment of problems/constraints associated with artificial insemination service in Ethiopia

Desalegn Gebremedhin Gebreegziabiher
Addis Ababa University, Ethiopia

Abstract: Study on reproductive performance of 18 AI bulls and on the efficiency of AI operations was conducted at the National Artificial Insemination Center and in purposively selected ten areas of five regional states. This study was also conducted to assess the problems and constraints associated with artificial insemination service. The 18 bulls were owned by NAIC and were in semen production. Questionnaire survey was also carried out on technical staffs that were performing their duties at the National AI Center. Evaluation of number of services per conception and conception rates to first insemination was carried out. Pregnancy diagnosis was performed on 375 cows in the selected areas. Besides, 114 straws of semen, 61 from regions, and the other 53 from NAIC were checked for semen motility to see if there were any differences in motility due to handling between the center and the regions. Thirty AI technicians and 246 farmers were used for the collection of data using questionnaire surveys. Moreover, fifty-two high-level professionals who have stakes directly or indirectly in the artificial insemination service have been used to participate in the focus group discussions.

Mean (± E) scrotal circumference for Holstein, Jersey and crosses of Holstein with indigenous breeds at NAIC was 39.71± 0.64, 41.00 ± 1.16 and 39.00 ±1.00 respectively. The results did not differ (p>0.05) among the three breeds. Similarly, the outcome of semen physio-morphological analysis revealed that there was no difference (P>0.05) for the different semen characteristics except for the total morphological defects which differed significantly (P<0.05) among the three breeds.

The sources, the selection procedures, and the health status of the AI bulls at NAIC were found to have serious problems. Mean (± SE) number of services per conception and conception rate to first insemination were 1.74 ± 0.07 and 16.08 ± 0.44 respectively. These results differ significantly (P<0.001) among the five regions. 40.53% of the total cows used during the study have been

found to be repeat breeders. Mean (± SE) semen motility for the NAIC and for the regions were 53.2% and 51.7% respectively and there was no difference (P>0.05) between the NAIC and the regions.

The overall results of the assessment via questionnaire surveys and focus group discussions at large have indicated that artificial insemination is not doing well in all the regions and at national level at large. It is inferred, therefore, that artificial insemination operation in Ethiopia is not a success and requires urgent measures to change the situation before it totally collapses.

Social networks and diffusion of agricultural technology: The case of sorghum in Metema *woreda*, North Gondar, Ethiopia

Dessalegn Molla Ketema
Haramaya University, Ethiopia

Abstract: Information on technology adoption and diffusion in a given society is important for focusing future research, extension, government and NGO-led development efforts aiming at benefiting the majority of Ethiopian farmers. The identification of the roles of social networks that influence technology adoption and diffusion is important to identify and design measures to remove or alleviate the constraints affecting diffusion of innovation. This study was undertaken in Metema *woreda* of North Gondar Zone, Amhara National Regional State and has been designed to throw light on the existing formal and informal social networks among re-settlers. The extent of functional contributions of social networks and their gender implications in the diffusion of sorghum technology, and identification of options for enhancing the role and sustainability of these social networks for promoting agricultural innovation in the *woreda* was the focus of this study. Multistage sampling procedure was employed to select 2 PAs out of 18 PAs in the *woreda* and 160 sample households from these 2 PAs. Both qualitative and quantitative data were used to obtain reliable information from primary and secondary sources. Data analysis was done using descriptive statistics, T-test and chi-square test. The this study variations were observed between previous and recent settlers as well as male and female headed households in terms of membership in different economically oriented groups and associations and participation in social networks. The binary logistic regression model out put showed that marital status, family size, number of close friends and membership in cooperatives were found to have positive and significant influence on the adoption of improved sorghum varieties. Likewise, education and years of residence in the village have negative and significant influences on the dependent variable. The study also revealed that, relatives, friends and neighbors were the most important nodes of information source, seed sources and mutual support; and influential networks in the adoption and diffusion process of the study area. To strengthen these influential social

networks the organization and empowering of these networks and promoting into community based self help farmers groups with genuine support and supervision from governmental and non-governmental organization is imperative.

The role of dairy cooperatives in stimulating innovation and market oriented smallholders development: The case of Ada'a Dairy Cooperative, central Ethiopia

Eshetu Tefera
Haramaya University, Ethiopia

Abstract: For an agriculturally dependent country like Ethiopia, dairy development has enormous scope for rural development and national prosperity. Dairy cooperatives are needed to consolidate the efforts of small producers to provide processing and transport facilities on a large scale. Organizing farmers through dairy co-operatives can have many advantages over individual farming. First, co-operatives can improve or facilitate access to market information, reduce costs of marketing and can increase producers' access to technology, extension and related services, and thereby enhance efficiency in the process of production and marketing of dairy products. Second, dairy marketing co-operatives can help to decrease transaction costs and price risks, and enhance bargaining power of dairy producers. These lead to increased return from commercial dairying which in turn stimulates innovation in the sector. This study was undertaken to explore the role of dairy cooperatives in stimulating innovation and market oriented smallholders' development by taking Ada'a dairy cooperative as a case study. It entails the specific objectives of investigating the role of the cooperative in promoting innovations, linkages for access to services and marketing and enhancing knowledge and information sharing. Primary data were collected from 150 smallholder dairy producer members of the cooperative. This was supplemented by information from focused group discussion with dairy producers, board members of the cooperative and key informants. The study result showed that the cooperative has started to enhance innovations in the dairy sector which include technological, institutional and organizational innovations, promoting linkages for access to marketing and services and in sharing knowledge and information. With regards to technological innovation the cooperative introduced milk processing using its own processing machine and started to produce quality products as pasteurized milk, butter and cheese. The cooperative had many activities with regards to institutional innovation,

which include: provision of dairy inputs, marketing, creating employment opportunities, having well designed organizational and financial systems and addressing development issues. Organizationally there was weak interaction among members and board members of the cooperative. The cooperative is performing good in promoting market oriented dairy development through creating market link to the urban and peri-urban subsystems, collaborating with other dairy associations, public organizations, NGOs, projects and donors affiliated on MODD. The cooperative has been sharing dairy related knowledge and information by providing training and advisory services; based on that 55% of the sample respondents have got training on dairy production and marketing through the cooperative during the last three years; and all sample members of the cooperative have got advisory services using innovative members and staff members of the cooperative (85.33%), staff of the district agricultural office (8%), NGOs (4.67%) and DzARC (2%).

On-farm characterization of Black Head Somali sheep breed and its production system in Shinile and Erer districts of Shinile Zone

Fekerte Ferew
Haramaya University, Ethiopia

Abstract: The study was carried out in Shinile and Erer districts of Shinile Zone of the Somali National Regional State. The objectives of the study were: to characterize the production system and phenotypic characteristics of the Blackhead Somali; to evaluate on-farm survivability/ mortality of Blackhead Somali lambs during pre-weaning period and to determine the best fitted regression model for prediction of live weight of Blackhead Somali sheep breed based on body measurements under field conditions. Data were gathered through semi-structured questionnaire, focus group discussions, field observations and linear body measurements of sample populations. The overall least square mean reported Blackhead Somali sheep was 19.19. Generally, decreasing trends in Blackhead Somali sheep breed was reported. The major feed resource was natural pasture and source of water were from rivers, wells, natural ponds. Corral was used to house the sheep and goats together and they practiced partial controlled mating system. The reported production constraints were disease, feed and water shortage. According to farmers' report, the overall average age at puberty in females was 17.97 ± 3.97 and 13.65 ± 4.75 months in males. Age at first lambing, lambing interval, reproductive life span, and life time lamb production were 23.56 ± 3.63 months, 10.46 ± 2.58 months, 9.12 ± 1.6 years and 8.18 ± 2.27 lambs, respectively. Per-weaning mortality rate was 47.8% and the major cause was disease (59.1%). The coat color patterns of Blackhead Somali sheep breed varies from patchy, pied and plain. The dominant color was black color of the head with white body color; body covered with short smooth hair, fat rumped tail and straight head profile; wattle was absent in female but present in male. The sheep flocks observed constituted higher proportions of females than males. Sex of animals had significant effect on body weight and linear body measurements except tail length, ear width and cannon bone circumference.

Males were heavier than females (29.50 kg vs. 25.80 kg) and had higher heart girth (72.72 cm vs. 71.29 cm), height at withers (61.30 cm vs. 59.97

cm), and body length (65.82 cm vs. 63.94 cm). The district effect was significant (p<0.05) for some measurements. Dentition classes of animals contributed significant differences to the body weight and some of linear body measurements. Body weight was highly correlated (P < 0.01) with body dimensional traits with moderate to high positive correlation both in males (r=0.62 - 0.81) and females (r=0.63-0.83). Based on fitted regressions models, heart girth was found to predict body weight with higher precision; height at wither with body length in combination with heart girth explained up to 75 % variation in body weight in both sexes. Best Fitted Regression equation based on R^2 Value are Y= 34.95 + 0.15 BL + 0.52 HG + 0.19 HW + 0.06 TC (R^2=76%) for females and Y=-29.4 + 0.2 BL + 0.4 HG + 0.17 HW + 0.11 TC (R^2=77%) for male. Generally this breed showed their ability to thrive well and their potential for meat production under the prevailing harsh environmental conditions.

Analysis of the role of cooperatives in agricultural input–output marketing in Eastern Zone of Tigray

Jemal Mahmud
Mekelle University, Ethiopia

Abstract: Ethiopia is among the poorest countries in the world where agriculture is the major source of living for more than 83 per cent of its people. Besides, the sector is the dominant one in the national economy. But agricultural performance in production and productivity is poor to bring sustainable changes in the living standards of the rural community. Among others, underdeveloped agricultural marketing system is a major factor responsible for the poor performance of the sector.

The overall objective of the study is to analyze role and functions of MPCSs in agricultural input/output marketing in Eastern Tigray Zone of Ethiopia. In order to see the role of cooperatives, it was preferred to give emphasis on evaluating their overall performances and members' participation as well as perceived problems in using the available services. Simple percentage analysis, ratio analysis, descriptive and econometrics model were employed to identify determining factors of the role of cooperatives in performing their activities as well as participation of the members. Therefore, two districts and seven MPCSs were selected at random from Eastern Tigray Zone for the study. A total of 162 member households of cooperatives were considered for this study and were included in the econometric model. In addition, secondary data obtained from relevant institutions were used.

The result of performance of MPCSs was presented organizing into three categories such as functional, organizational and financial performances. The result shows that MPCSs in Saesi-Tsaeda-Imba are functioning better in food grain distribution, input supply and credit provision than MPCSs in Atsiby Womberta. MPCSs in the two districts provided both medium term and short term loans for fertilizer and seed, and household package programs. With regard to organizational performances, the cooperatives have their own working procedures and systems, by-laws, employees and boards, and working areas. Ratios were analysed taking the five years financial data (2002 and

2006). The liquidity analysis, financial leverage and profitability ratio showed that the over all performance of cooperatives under investigation were weak or below the desirable level. T-test and result showed significant difference in the age, Livestock ownership, crop production, annual income, expenditure, input purchased, share capital contribution between the mean of two sample groups at less than 10 per cent probability level, and Chi-square test result: sex, access to input/credit, membership, educational status, and so on showed that significant differences between the two sample groups at less than 10 per cent probability level.

Econometric software called "Limdep" was employed to estimate the Tobit model to identify factors influencing the participation (intensity of participation). Probability of participation appeared to be significantly and positively influenced by education status, sex, number of paid up share capital, off-income, livestock owned, access to input credit, membership status, access to alternative marketing and members' satisfaction; while the influence of members' age, off-farm income and access to alternative market had inverse relationship and significant to determine participation. Perceived role performance, perception of members' on transparency, expenditure, on-farm income, annual income, input purchased, perception on input/ output prices, etc. were not significantly related to the dependent variable. Moreover, perceived problems and members' suggestions were also identified sufficiently to analyze role of cooperatives such as internal/organizational, external and infrastructure related problems. Performance of cooperatives and members' participation were used as key factors to analyze cooperatives' role in agricultural input/output marketing in the study area. The policy implication is that Government, NGOs and other stakeholders need to give emphasis on improving individual, organizational and institutional capacity of cooperatives.

Estimating the seroprevalence of East Coast fever and determination of associated risk factors in the cattle population of Mbeere district, Kenya

John M Gachohi
University of Nairobi, Kenya

Abstract: Agricultural growth is important for most countries in sub-Saharan Africa. Mixed farming systems, in which crops and livestock are integrated on the same farm, are widespread in the rain-fed sub-Saharan Africa including Kenya. Livestock are both an integral and indispensable part of mixed farming systems in sub-Saharan Africa. Livestock production systems in Kenya are, however, at risk from tick-borne diseases (TBDs) amongst other constraints.

The most important tick-borne disease of cattle in Kenya is East Coast fever (ECF) caused by *Theileria parva,* and transmitted by the tick *Rhipicephalus appendiculatus*. The occurrence and importance of ECF is a reflection of complex interactions involving the causative organism, tick vector, vertebrate hosts and environment. This complexity is expected to result in variability in disease response at the different levels of cattle population organization (for example, animal-, herd- or at the area-level). Previous studies did not investigate the influence of the hierarchical levels in the occurrence and distribution of ECF. The objectives of this study were therefore to identify potential livestock production constraints, estimate *T. parva* seroprevalence, and to identify and assess risk factors associated with *T. parva* seropositivity in Mbeere district in a cross-sectional survey. As the study data exhibited a nested hierarchy, further objectives included evaluating and quantifying variance components corresponding to three levels of organization (herd, sub-location and division) and using the variance components to identify levels in which there could be substantial opportunities for targeted interventions.

The farms were selected by a multistage random sampling method. All the four administrative divisions (Siakago, Gachoka, Evurore and Mwea) in the district were included in the study. Then, sub-locations and farms were randomly selected from sampling frame lists provided by the District Commissioner's office (sub-locations) or area sub-chief and village elders (farms). Sampling of

individual animals used proportional allocation approach. A constant 50% proportion of animals in each herd were selected using systematic random sampling approach. A total of 440 animals were sampled.

Risk factor information on social-economic data and on animal and farm level management practices was gathered using a standardized questionnaire. Potential livestock production constraints were analysed descriptively by proportions and rankings. Approximately 5 ml of blood were collected from the selected animals for serum preparation. Serum samples were assayed for antibodies to *T. parva* by Enzyme-linked immunosorbent assay (ELISA). The relationship between *T. parva* seropositivity and risk factors was assessed by multivariable logistic regression models. To investigate the contribution of the levels of organization to the total variance of ECF seropositivity, this study applied multilevel models using Schall's algorithm.

The 80 farms selected represented approximately 1.7% of all farms in the sampling frame (n=4783). Ninety four percent (94%) of the households depended on both crops and livestock as the main farm activity while the rest depended on livestock only. Sixty three percent (63%) of the households depended on both crops and livestock for household cash income. Overall, 90% of the households kept only indigenous cattle breeds and their crosses reared under open grazing management systems. Reasons advanced for keeping cattle in order of importance were milk, homestead "security" banks, traction and manure. Feed and water availability and diseases were ranked as the most important farm constraints in all divisions. East coast fever was ranked first only in Mwea division.

The overall *T. parva* seroprevalence was 19.3% (range: 3.9% to 48% across divisions) in the district [95%CI: 13.7%, 24.9%]. Multivariable regression analysis found four major factors associated with *T. parva* seropositivity: presence of the vector tick on the farm, frequency of calf tick control before 6 months of age, herd size and division. There were distinct differential herd tick control practices across the district. Farmers with large herd sizes came from divisions with the least seroprevalence (Siakago and Gachoka) whereas those with smaller herd sizes were from divisions with higher prevalence (Mwea and Evurore). Division, as an area-level variable, had the most important and

large effects associated with *T. parva* seroprevalence. As divisional boundaries are administrative in nature, a multivariable model without division was built to investigate significant effects which could have been masked by effects of division. Three additional effects became significant: age at which calf tick control was started, Normalized Differential Vegetation Index (NDVI) and agro-ecological zone. For the overall measure of *T. parva* seropositivity, substantial variation rested at both herd- and division levels under the multilevel model analysis. Extending Schall's procedure for higher level effects usually provided additional information as the model that included only the herd-level random effect provided larger estimates of herds' variance component (4.05) than did models with additional area effects (3-level model: 2.34; 4-level model: 2.22). The herd variance component did not change significantly on addition of higher random controlling for the fixed effects: (2-level model: 2.7; 3-level model: 2.36; 4-level model: 2.22). The variance due to herd was generally larger than those due to geographical areas under all circumstances.

The study findings demonstrated that the farms in the district consist of different 'parts', which together act as a whole where the yield of the total farm is more important than the yield and/or efficiency of the 'parts'.

The low *T. parva* seroprevalence indicated that ECF occurred in the district in an endemic instability state. The differential herd tick control strategies across the district probably arose out of differences in perceptions of ECF occurrence and importance. The large geographical variation could be related to possible differential ecological and climatic variability in vector suitability habitats in the district. These observations suggested that *T. parva* seroprevalence in Mbeere district was mainly influenced by herd and environmental effects as factors that varied from herd to herd and from division to division were the most important sources of variation. These results implied that both among-farm and -division transmission factors were more important in designing ECF control strategies in the district. Thus, practical ECF intervention strategies should be directed at all farms within the two high risk divisions of Mwea and Evurore for the control efforts to have the greatest impact.

Molecular characterization of Kappa-Case in gene polymorphism in indigenous eastern Africa goat populations

Kiplagat Sammy Kipkosgei
Egerton University, Kenya

Abstract: Indigenous goat breeds kept by majority of smallholder rural farmers in Eastern Africa are adapted to the local environment. These goats are critical for nutrition and income of their keepers. Milk production per doe is extremely variable. The variation in milk yield in goats is due to varied management practices i.e. nutrition, disease control and housing, and variability in genetic make-up of the goats. Several studies that have examined the loci involved in the control of the milk proteins in cattle have concluded that the alleles of these loci may be used as genetic markers of quantitative trait loci (QTL) for milk yield, composition and quality. The objective of this study was to evaluate variation in kappa-casein gene (CSN3) and the distribution frequencies of its variants amongst Eastern Africa goat populations. Samples of ten goat populations were used. Goat samples were collected from three populations in Kenya. Samples of seven goat populations found in other eastern Africa countries (Tanzania, Somalia, Ethiopia and Sudan) were selected from the ILRI Bio-Bank. These samples were analysed for single nucleotide polymorphism (SNP) at CSN3 exon 4. A 458 bp sequence of CSN3 exon 4 was amplified and sequenced. Nine polymorphic sites were identified. Seven variable sites had previously been identified in other goat populations outside Africa and two were newly identified. A total of nine haplotypes were identified, five had been previously identified in other goat populations. A SNP genotyping protocol based on primer extension (single base extension) was proposed. The protocol can be used for cost-effective genotyping of a large number of samples in association studies to determine the relationships between CSN3 variants and milk production traits. This study will be useful in providing allele/haplotype information that can be utilized in association studies necessary for designing of genetic improvement programs for better milk production.

On-farm performances of Washera sheep at Yilmanadensa and Quarit districts of the Amhara National Regional State

Mengistie Taye Terefe
Hawassa University, Ethiopia

Abstract: On-farm performance data on Washera sheep, collected from October 2004 to September 2007 at Yilmanadensa and Quarit districts of the Amhara National Regional State, was used for the study. Six linear body measurements were taken. Farmers' general production condition was assessed using Participatory Rural Appraisal techniques. Farmers in the mixed crop-livestock production system of the study area keep their sheep on communal grazing pasture as main feed resources. Ewes lambed throughout the year with peak lambings occurred in February and August. Docking of the fat tail of ewe lambs is done at about 2-4 months of age. The main sheep production problems reported were feed shortage and disease outbreaks. The average flock size per household was 9.58 (range: from 1 to 29). Flock composition by dentition group was 52.2, 9.9, 8.3, 5.2 and 24.3% for 0, 1, 2, 3 and 4 dentition groups (permanent incisors), respectively. Similarly, the flock composition by sex was 21.8, 76.4 and 1.8% for males, females and castrates respectively.

The mean age and weight at first lambing was 464.2±14.0 days and 24.7±0.5 kg. The weight at first lambing was significantly affected ($p<0.05$) by district and parity of the dam. Average lambing interval was 271.1±3.6 days and was affected by district, lambing season, parity, and birth type. The average number of lambs per ewe lambing was 1.11±0.01. It was significantly ($p<0.0001$) affected by lambing year and postpartum ewe body weight. The least square mean birth weight, 30 days, 90 days, 180 days, 270 days, 360 days weight and postpartum ewe body weight obtained was 2.7±0.02, 6.8±0.1, 11.9±0.1, 15.4±0.9, 20.1±0.6, 23.6±0.7 and 31.0±0.2 kg, respectively. Birth weight was significantly ($p<0.001$) affected by district, birth year, parity of the dam, sex of lamb and birth type. The 90 days weight also was significantly affected (at least $p<0.05$) by district, birth season, parity of the dam, sex of lamb and birth type. Birth year and sex of lamb were significant (at least $p<0.05$) source of variation for 360 days weight. Postpartum ewe body weight was significantly influenced

(at least p<0.01) by district, birth year, birth season, parity and type of birth. The mean average daily gain (in grams) from birth to 30 days, birth to 90 days, 90 to 180 days and birth to 360 days was 140.5±3.3, 103.7±2.0, 41.6±8.2 and 59.1±3.1 respectively. The effect of birth year, parity and birth type were significant (at least p<0.05) for growth rates from birth to 30 days and birth to 90 days of age. Sex of lambs also significantly (p<0.001) affected growth rate from birth to 360 days. The overall cumulative least square mean survival (in %) from birth to 30 days, 90 days, 180 days, 270 days and 365 days was 98.4±0.6, 93.6±0.9, 91.2±1.1, 90.0±1.2 and 89.9±1.2, respectively.

Except at the age of 30 days, district, birth season, birth type and birth weight significantly (at least p<0.05) affected survival at all older ages. Parity and sex of lambs were not significant (p>0.05) for survival at all ages. Least square means and correlations of six linear body measurements (weight, body length, height at wither, heart girth, pelvic width and ear length) were determined. Positive and significant (p<0.01) correlations were observed between weight and other measurements. Heart girth had the highest (r=0.972) correlation coefficient with weight. Regression equations fitted were good (R^2 = 50 to 92%) xiv at estimating body weight from body measurements. Equations fitted for the pooled age group had high coefficient of determination (R^2 = 92.2%) and can be used for all age groups at field level. Finally, this on-farm breed information on growth, reproduction, survival and linear body measurements need to be supplemented by on-station characterization and genetic parameter estimation of some important traits of the breed to better understand the genetic variations and potential of the breed and design appropriate breeding strategies. In addition, the feeding and health problems identified needs to be tackled.

Key words: Washera sheep, reproduction, growth, survival, linear body measurements, Yilmanadensa, Quarit

Social networks and gender dimensions in the use of irrigation by farmers in Alamata *woreda*, Southern Tigray, Ethiopia

Mikinay Hailemariam
Haramaya University, Ethiopia

Abstract: Access to input/technology, information/knowledge, credit/finance is very decisive for the development of a given society in general and irrigation based high value crop production in particular. The identification of the contribution of social networks in facilitating access to these resources and services and thereby influence crop choice among irrigation user farmers is vital to identify the important actors contributing in irrigation based vegetable production. This study was undertaken in Alamata *woreda*, Southern Zone, Tigray National Regional State and has been designed to give a clue on the existing formal and informal social networks and groups in facilitating access to resources and services, among irrigation based vegetable growers and non growers. The practical contributions of social networks and their gender implications in facilitating access to inputs/technologies, information/knowledge and credit/finance in irrigation based vegetable production; and identification of alternatives for enhancing the role and sustainability of these social networks for promoting vegetable production in the *woreda* was the focus of this study. Identifying the factors for choice of crops by farmers in using irrigation was also another additional objective of the study. Multistage sampling procedure was employed to select 4 PAs out of 10 PAs in the *woreda* and 150 sample households from the 4 PAs. Both qualitative and quantitative data were collected to obtain reliable information from primary and secondary sources. Data analysis was done using descriptive statistics, mainly. Chi-square and ranking was used to see the contribution of social networks & their relative importance in facilitating access to resources and services among vegetable growers and non growers as well as FHHs & MHHs, separately. T-test, chi-square test, mean, percentage and frequencies were also used to identify preceding factors for growing or not growing vegetables, in addition to binary logistic regression model. This study revealed variations between vegetable growers and non growers as well as MMHs and FHHs in terms of membership in different economically oriented groups, frequency of use of

different social networks as a source of different inputs and services and in terms of perceived relative importance of different social networks (formal and informal networks). The binary logistic regression model out put showed that marital status, education level, on farm income, DA contact, participation in extension events and number of relatives & close friends were found to have positive and significant influence on the choice of vegetable crops by farmers. The study also revealed that formal networks are the most frequently used and the most important sources of inputs and information for vegetable growers in general and MHHs in particular, on the other hand informal networks were found to be the most frequently used and the most important sources of inputs and information for vegetable non growers in general and FHHs in particular. Generally, both informal and formal networks are found to be important in the study area, hence recognizing the importance of informal networks (groups), and strengthening & organizing them in to self help groups is very important. In addition, after identifying influential social networks establishing linkage among formal and informal networks has paramount importance for better efficiency of the contribution of social networks, in enhancing culture of growing vegetable crops among the community members in particular, and rural development in general.

Measuring the perceptions for the attributes of quality and safety in milk and butter: An application of conjoint to the case of urban Ethiopia, Addis Ababa

Osman Negus
Addis Ababa University, Ethiopia

Abstract: This study measures the perceptions of consumers on quality and safety attributes of milk and butter in urban Ethiopia taking the case of Addis Ababa. The main objective of the study was to identify the major attributes of milk and butter as perceived by consumers. The study has also tried to identify the major socioeconomic and demographic determinants of perceptions for quality and safety of milk and butter. The study is based on a randomly selected 300 households in Addis Ababa. In the analysis, descriptive statistics, conjoint analysis and order probit model were used. The research indicated that the most frequently purchased milk products are raw fresh milk, packed pasteurized milk and butter. These products are distributed through home delivery, producer gate and corner shop. Among the attributes identified by RMA, hygiene, adulteration and smell in milk; and hygiene, purity and price in butter, were the most preferred attributes in consumers' purchase decision. The result further shows that the demand for quality and safety improvement of milk was relatively price inelastic as compared to butter.

With regard to socio economic factors, however, variables such as sex, number of schooling, family size and duration of stay in Addis Ababa were insignificant, indicating that rating is not affected by gender, level of education, number of years lived in Addis Ababa though income and age were found to be significant. For butter, age, sex, number of schooling, family size and income were significant but the signs of the coefficients of number of schooling and income were contrary to the expectation. It indicates that, unlike milk, consumers' perception for quality and safety of butter differs across the different socioeconomic and demographic categories of the consumers. It indicates that the younger generations are more concerned about quality and safety of butter. Moreover, female respondents showed more concern compared to the male respondents.

The research gives a clue to producers and regulatory authorities that those factors mentioned above should be taken into account in their decision making process. The findings of the research could further be validated by employing more sample size and /or comparing results of different methodologies.

Institutional analysis of water management on communal irrigation systems in Ethiopia: The case of Atsbi Wemberta, Tigray Region and Ada'a *woreda*, Oromia Region

Rahel Deribe
Addis Ababa University, Ethiopia

Abstract: This study analyses the institutional and organizational arrangements of irrigation water management and identifies the determinants of collective action and its effectiveness in managing communal irrigation schemes in the districts of Atsbi Wemberta (Tigray region) and Ada'a (Oromia region), Ethiopia. Results are based on data collected from a survey of 169 groups (communities) and 22 scheme level focus group interviews. All *tabias* which have irrigation projects that operated, in year 2006/07 are included. Analysis of descriptive and econometric methods is used. Analysis of qualitative information supplemented the econometric results.

Our result reveals that in Atsbi, over 221.1 ha of land, there are 14 irrigation schemes which are used by 1855 beneficiary households. On the other hand, in Ada'a there are a total of 2059 irrigation water beneficiaries in 8 communal managed schemes, which irrigate 960.5 ha of land. Each irrigation scheme is a common property resource that is owned and managed by the community. In both study areas, each scheme has its own water users association which is administered by water users committee. The associations are local institutions which have a basic character of authority and by-laws. In addition, water users form groups at each outlet (block) level for administrative purposes, which are managed by group (block) leaders. They are 94 in Atsbi and 75 in Ada'a. In each irrigation schemes, rotational irrigation is practiced based on counting dates or complaints, but not based on the water need of plants.

The econometric results show that collective action is more effective in irrigation water users of Atsbi than Ada'a. We also found evidence for an inverted U-shaped relationship between number of household beneficiaries and collective action. The findings also imply that community irrigation water management can contribute to a more sustainable irrigation water use and as a

result in increasing agricultural production and productivity. Collective action for irrigation water management may be more beneficial and more effective in areas with intermediate number of beneficiaries, in areas that are close to market access, in groups that have longer years of experience in irrigation water use, groups with larger family sizes, in communities with greater number of local organizations, and in schemes where there was participation of beneficiaries during construction of the scheme.

Though women are found to be significantly involved in irrigation agriculture in male headed households, the revenue generated from agriculture is controlled by men. On the other hand, we found that the participation of female headed households at forum and leadership is very low. However, the estimation result shows that less number of conflicts and violation of rules are associated with high proportion of female household heads. This suggests policy intervention is needed to encourage the participation of women in farm, forum and at leadership level in water users association and in conflict resolution committee. In addition, effort should be made to change the wrong perception of the society towards gender inequality.

Our evidence also shows that instead of higher level of education status, it is greater number of provision of training which favors collective action. Thus, expansion of training for beneficiary farmers by governmental and non-governmental organizations will have a positive and a significant impact on increasing efficiency water use collectively. In communities that are more remote from markets or have larger number of beneficiaries, private–oriented approaches to resource management may be more effective. Access to formal credit and extension programs have a positive significant impact on collective action. Therefore, emphasis should be given on availability of such institutional support services. The presence of external organizations reduce local efforts to enforce the restricted rules, suggesting that the roles of external organizations needs to be demand driven and complementary to local inputs .

Generally, collective action in managing irrigation water functions well in both study *woredas*. It is found that farm households have started to grow crops which were not previously grown in the areas. It was also found that it has a positive impact on their income as well as on the living standard of their

families. In addition, through time beneficiary farm households depend more on the production from their irrigated fields, which enabled them to harvest more than once a year. Therefore, as beneficiary farmers shift to high value but perishable commodities, emphasis should be given to marketing extension, especially in facilitating markets and marker linkages to farmers. Furthermore, through time the demand for irrigation water increases among beneficiary farmers. Therefore, assigning of water rights and strengthening organization and operation of WUAs will be very essential for further efficient use of the common pool resource.

Molecular epidemiology of African animal trypanosomiasis in Western Kenya

Samuel Thumbi
University of Nairobi, Kenya

Abstract: Studies on the epidemiology of African bovine trypanosomiasis have concentrated on the temporal aspects with the longitudinal studies rarely considering the spatial dimension of disease prevalence. The problem is amplified by the low sensitivity of the parasitological diagnostic methods used in these surveys. This study aimed at combining highly sensitive molecular diagnostic methods, and Geographical information system (GIS) for spatial analysis, to provide accurate information and a better understanding on the epidemiology and control of bovine trypanosomiasis in Teso and Suba districts, Western Kenya. In addition, diagnostic capacities of three PCR based methods already developed namely; species specific primers, single, and nested PCR's based on primers amplifying the Internal Transcribed Spacers (ITS) region of rDNA was evaluated and compared. Blood samples obtained from forty four animals sampled from Teso and fifty nine from Suba was collected together with the geographical coordinates of every sampling site. In total 103 samples were screened for trypanosomes using the three PCR based diagnostic assays to compare and evaluate the diagnostic capacities of each of the methods. Using ArcView and ArcGis Geographical information systems software, the distribution of all cases detected positive for trypanosomes was analysed. Results showed higher trypanosome prevalence in Suba district (40.67%) compared to 29.44% in Teso with *T. vivax* infections being the most prevalent species in both districts. *T. brucei* infections were relatively higher in proportion in Suba district (11.7%) compared to Teso (2.27%), a significant finding since parts of Suba are known to be sleeping sickness foci. Nested PCR detected the highest number of trypanosome infections (28.1%), the single ITS based PCR detecting 26.2% while the species specific primers detected 10.7% of the samples as positive for trypanosomes. Cohen kappa statistic was used to determine the agreements between the three tests. The results showed highest agreement (0.6) to be between the two ITS based tests, and the lowest (0.2) between the nested PCR test and the species specific primers. To

determine the spatial pattern of the trypanosome cases detected, an average nearest neighbour analysis was used and gave a Z–score of 0.9 and – 1 for Suba and Teso districts respectively, indicating a random pattern of the disease distribution. An overlay with the tsetse maps showed cases lying outside the tsetse infested areas, mostly being cases of *T. vivax* infections, which are known to be transmitted both biologically by tsetse and mechanically through other biting flies. These findings suggest a need to design control strategies that target not just the biological vector tsetse, but also possible mechanical transmitters as iatrogenic methods that could help explain the high prevalence of *T. vivax.*

Determinants of smallholder farmers access to formal credit: The case of Metema *woreda*, North Gondar, Ethiopia

Sisay Yehuala
Haramaya University, Ethiopia

Abstract: In Ethiopia, among other things, lack of finance is one of the fundamental problems hampering production, productivity and income of rural farm households. Since access to institutional finance is very limited, the majority of the poor are forced to search financial services through informal channels. The study was sought to ascertain factors that affect smallholder farmer's access to formal credit and also the status of women and different wealth groups' access to formal and informal credit sources in the study area. A two stage sampling method was employed to select three out of eighteen rural peasant associations and 130 farm households. Structured interview schedule was developed, pre-tested and used for collecting quantitative data for the study from the sampled farm households. Focus group discussion, group interview and field observations were held to generate qualitative data. Descriptive statistics and logit model were used for analyzing quantitative data. The output from the study indicates that 56 (43.1%) of the sampled farm households were formal credit users, whereas the remaining 74 (56.9%) were non-users. It was also found out that credit access to female headed households is still limited and the difference between the wealth groups in accessing credit from the formal sources was also statistically significant. Farmers acknowledge group lending that solves the problem of collateral requirement by lending institutions, controls misuse of borrowed funds and minimizes the risk of default and they also recognize the provision of saving services by MFI, while strongly criticizing the isolation of very poor farmers from the group formation. Moreover, the smaller loan size, earlier saving requirement which was not convenient to the farmers, and repayment period by the MFI were among the critical problems. Participation in extension package programs, Experience in credit use from the formal sources, total cultivated land size, number of livestock in TLU, collateral or group formation and membership of FMSC were highly important in influencing access to formal credit use as evidenced by the

model output. Therefore, policy aimed to accelerate agricultural development in the area could be successful if these factors and problems are taken into consideration to access credit from the formal financial sources.

Genetic characterization of selected east African indigenous cattle

Selieli, Wasike
University of Nairobi, Kenya

Abstract: The indigenous cattle breeds of Kenya have special adaptations (resistance to diseases, utilization of low quality feeds and surviving under high tropical temperatures). There is a risk of loosing the unique adaptive features, and this loss arise from increased market demands for animal products (e.g. milk) which may lead to cross breeding and replacement with other types of breeds. Compounded by the lack of knowledge of their genetic characteristics, an urgent plan to conserve and manage Kenya indigenous cattle genetic resources is required. This study was undertaken to determine the genetic diversity and relationships as well as assess the evidence of exotic influence on Teso and Winam indigenous cattle populations from western Kenya. Three reference populations were included in the study (Friesian; European *Bos taurus*, N'Dama; African *Bos taurus*, and Boran; *Bos indicus*). Genotyping was done using Y-Chromosome specific Marker (INRA124) and 12 autosomal microsatellite DNA markers.

According to expected heterozygosity (HE) and observed heterozygosity (HO) results, Winam and Teso cattle populations were generally outbred (HE: Winam = 0.708, Teso = 0.723; HO: Winam = 0.662, Teso = 0.670). There was insignificant genetic distance (DA = 0.035) and gene differentiation (FST = 0.000) between Teso and Winam cattle populations at $P \leq 0.05$. Sharing of recent common ancestor, same migration routes from point of origin, common cattle markets and cultural practices may account for genetic similarity. No significant correlation between genetic and geographical distances was detected among Winam and Teso cattle populations. Admixture estimates and Y-chromosome DNA analysis results indicated evidence of introgression of exotic cattle with Teso (~ 8%) and Winam (~ 8%) indigenous cattle populations. This was expected because; in 1980 the Kenya and Dutch Governments initiated a National Dairy Development Project (NDDP) that was meant to improve milk production by crossing indigenous with exotic cattle country wide using artificial insemination (AI). In conclusion, the conservation

program may encompass Winam and Teso indigenous cattle populations as a single breeding unit as opposed to community based naming which classifies them as different populations.

Farmers' evaluation and adoption of improved onion production package in Fogera district, South Gondar, Ethiopia

Tadesse Adgo Mihiretu
Haramaya University, Ethiopia

Abstract: Onion is one of the most important horticultural crops categorized under root crops. A global review of major vegetables shows that onion ranks second under area cultivation. Ethiopia has an enormous potential for production of vegetable crops in general and onion particular and it is also among the most important export crops. Onion is one of the most important vegetable crops grown in the study area, Fogera. It contributes to the major share of daily cash source. The objectives of this study were: to identify farmers' evaluation and selection criteria of improved onion varieties disseminated in the study area; to identify intensity of adoption of farmers in the study area. This study interviewed 140 sample households using structured questionnaire and out of the total 140 sample households 10% were women. In this study, data were collected and analysed qualitatively and quantitatively. Quantitative data analysis methods were employed mainly with chi-square, F-test and Tobit model using SPSS and Limdep computer soft ware. In farmers' evaluation and selection criteria of improved onion varieties disseminated in the study area Bombay red ranks first and Adama red ranks second. Early maturity, good yield, large bulb size, and good bulb colour were the most important traits of improved onion identified as a selection and evaluation criteria in the study area. Result of the econometric model indicated that household head's education status of the household head access credit, participation in extension event (participation in training and field day), participation cooperative society and frequency of visiting out side his/her social system were important variables which had positively and significantly influenced adoption and intensity of adoption of improved onion production package. Where as, farmers' perception towards improved onion production technology had shown negative relationship with adoption and intensity of adoption. All most all farmers who adopted improved onion varieties have not implemented the recommended spacing mainly due to its labour intensive

practice. The overall finding of the study underlined the high importance of institutional support in the areas of extension training; strengthening cooperative societies, and improving market condition to enhance adoption of improved onion production package.

Characterization of Menz and Afar indigenous sheep breeds of smallholders and pastoralists for designing community-based breeding strategies in Ethiopia

Tesfaye Getachew Mengistu
Haramaya University, Ethiopia

Abstract: This study aimed at understanding of existing sheep breeding practices, identifying sheep breeding goals and characterizing the morphological and biometrical characters of Menz and Afar sheep breeds in their habitat as a step towards developing sustainable sheep breeding strategy. The study was conducted by implementing single visit questionnaire, observing and recording of sheep morphological characters, and by recording body weight and body measurements. The survey revealed that the mean sheep flock size per household was 31.6 in Menz and 23.0 in Afar area. Nearly half of the pastoralists in Afar area and one-fifth of smallholder farmers in Menz area do not have breeding ram. The survey revealed the predominance of uncontrolled mating, small flock size and less proportion of breeding male (especially in Afar sheep). Mixing of different sheep flocks within a village was varying by season in both production systems. When flocks are mixed, the inbreeding coefficient could be reduced by 86% in Menz and 78% in Afar sheep flocks. Menz and Afar rams were castrated at the age of 1.7 and 1.5 years, respectively. After castration sheep were kept for longer period of time, 1.9 years (range of 0.25 to 5 years) and 3.1 years (range of 1 to 6 years) for Menz and Afar sheep breeds, respectively. Appearance/conformation was the most important trait in choosing of breeding ram for both Menz and Afar sheep owners. Lambing interval and mothering ability in both crop-livestock and pastoral systems and milk yield in pastoral systems were important traits for the choice of breeding ewes. Sexual maturity age of Menz ram was 10.5 months whereas Afar ram attains sexual maturity at average age of 7.1 months. Age at first lambing, lambing interval, twining rate and lifetime productivity of Menz sheep were 470.1 days, 255.1 days, 1% and 9.3 lambs, respectively. The corresponding values for Afar sheep were 405.6 days, 270.5 days, 5%, 12.1 lambs, respectively. The average market age of male and female Menz sheep were 11.3 and 11.9 months, respectively. Afar sheep were marketed at average age of 6.7 and 8.4 months for male and females, respectively. Afar

ewes had mean (standard deviation) milk yield of 224 (54) ml per day with lactation length ranging from 1.5 to 6.0 months. The purpose of keeping sheep in Menz area was to generate income followed by meat, manure, coarse wool and as means of saving, in that order. For Afar pastoralists milk production, meat consumption and income generation are the purposes for keeping sheep. In both production systems, feed shortage, frequent drought and disease were the most important sheep production constraints. Menz sheep are fat tailed (100%) and the tail was curved upward at the tip (99.5). Plain red, white and black coat colours were the dominant colours observed in Menz sheep with proportion of 29.3%, 21.6% and 15.8%, respectively. Almost all (99.1%) of the Menz ewes had no horn whereas most (92.3%) of the rams had horn. About 18.5% of the Menz rams had ruff (long hair around the neck region of the inner part) whereas females had no ruff. Menz rams had no wattle while 6.1% of the ewes had wattle. About 15.4% of the Menz sheep had rudimentary ear, 35.3% had short ear showing a tendency to incline downward and the remaining about half (49.3) of the sheep had larger and dropping/semi-pendulous ears. Afar sheep breed is fat tailed and the tail was curved upward having a wider tail both at the base and at the tip. The major (90%) coat colour of Afar sheep varies from white to light red; white with red patch along the back (41.9%), plain light red (30.9%), plain white (17.2%). Plain dark red accounted for 7% and the remaining few proportions were black, mixture of black and white; and dark grey. Almost all of the Afar sheep (99.2%) had straight head profile. Both sexes of Afar sheep breed are polled. About 2.4% of the female had wattle while all of the males had no wattle. The breed has no ruff, but dewlap is present in both sexes. Majority (78.6%) of the Afar sheep were short eared showing a tendency of inclination downwards and about 19.7% were with rudimentary ear. Long dropping ear found rarely (1.7%). Sex and age of the sheep had a significant (p<0.01) effect on body weight and many of the body measurements. Generally, body weight and measurements were higher for males and also increased as the age increased from the youngest or 0 pairs of permanent incisor (PPI) to the oldest age group (2 and above PPI). Body weight of mature (having 2 and above PPI) Menz ram and ewes were 24.9 ± 0.67 kg and 22.3 ± 0.13 kg, respectively. The corresponding values for Afar rams and ewes were 29.0 ± 0.84 and 24.5 ± 0.14 kg, respectively. Positive and highly significant (P<0.01) correlations were observed between body weight and most of the body measurements. Chest girth had consistently the highest correlation

coefficient (0.81 to 0.97%) with body weight in all age groups of both sexes of Menz and Afar sheep. Chest girth also the first variable to enter in to the model of stepwise regression analysis in both males and females of Menz and Afar sheep breeds by explaining the highest variation than other measurement. Thus chest girth could be used for the prediction of body weight, could serve as indirect selection criteria for body weight or it could help to measure progress of selection. The prediction of body weight could be based on regression equation $y = -23.42 + 0.67x$ for Menz rams, $y = -23.29 + 0.67x$ for Menz ewes, $y = -30.77 + 0.82x$ for Afar rams and $y = -31.0 + 0.80x$ for Afar ewes, where y and x are body weight and chest girth, respectively. It was concluded that genetic improvement programs targeting smallholder farmers in mixed crop-livestock and in the pastoral production system need to incorporate trait preference of farmers/pastoralist, multipurpose role of sheep and the existing traditional herding and breeding practices.

Dairy marketing chains analysis: The case of Shashemane, Hawassa and Dale districts milk shed, souhern Ethiopia

Woldemichael Somano
Addis Ababa University, Ethiopia

Abstract: The study was initiated with the objectives of analyzing dairy marketing chains in the Hawassa, Shashemane and Yergalem milk shed in southern Ethiopia. The milk shed encompasses Hawassa, Shashemane and Yergalem towns. Milk and butter were the two most important dairy products marketed in the areas. Data came from 180 dairy producing households, 97 butter traders, and 81 milk traders. The Heckman two-stage econometric estimation procedure was employed to identify factors that determine milk market participation decision and milk sale volume of the farm household in the area. The first step of the Heckman two stages procedures results showed that dairy household milk market entry decision was strongly and significantly affected by age of the household head, family size, education level, experience in dairy production, number of cross breed milking cows owned and distance from milk market center. In addition, the second stage estimation result revealed that marketable milk volume was found to be strongly and significantly affected by the number of cross breed milking cows owned, family size, age squared and annual non-dairy income source of sampled dairy household. Eighty five percent of sampled dairy household were identified to be milk market participants and about 65% of milk produced by sampled household was supplied to market. Dairy producers, retailers, farmer traders, iterate traders, dairy producers' cooperatives and semi-wholesale were found to be important milk and butter market intermediaries of the milk shed. The crossbreed and local breed dairy farm owner are respectively 67.4% and 32.6%. The S-C-P model identified that the markets for milk and butter in the study area was non-competitive type. The highest and the lowest net profit/lit in milk marketing respectively obtained by dairy producers and milk semi-wholesaler. In butter market, butter retailers enjoyed the highest net profit. Generally, milk and butter market in the study area seemed to be inefficient and underdeveloped. Thus, dairy development interventions should be aimed at addressing both dairy production technological gaps and marketing

problems. The study further suggested that dairy processing industries formation, dairy producers and trader cooperatives, and improving access to services should receive due attention in order to improve dairy production in general.

Efficiency of livestock feed resources utilization and forage development in Alaba, southern Ethiopia

Yeshitila Admassu
Haramaya University, Ethiopia

Abstract: This study was undertaken in the crop and livestock production system interactions of smallholders upon fixed and fragmented land holdings in livestock and Human populated area of Alaba, southern Ethiopia in an objective to quantify the major feed resources and evaluate the efficiency of utilizations of these feeds.

Results are based on 114 sample households' surveyed in the two great strata of the *woreda* called farming systems at two seasons which varied mainly on the types of commodities they produce and species of animals' dominance. Average family size of the households was 8.52 with Literacy of the households' leaders' value of 52.5 % for the *woreda* overall. Mean holdings of total lands and land use systems varied between the two study sites significantly (P <0.05) except for forest and wood land which was non-significant (P> 0.05) with Pepper/Wheat/livestock farming system having higher values than Teff/haricot bean/livestock system. Similarly livestock holding in (tropical livestock nit) TLU and total dry matter (DM) productions of feed resources were significantly different between the two study sites (P < 0.05) except for poultry which was non-significant (P>0.05) and the major sources of feeds for livestock near to 78% are obtained from crop residues followed by grazing lands. In this regard rate of cultivation of lands is far great for Teff/haricot bean/livestock system and significant differences of crop residues yield was observed between the two study sites (P<0.05) . General linear model (GLM) was fitted for Dry matter yield of private grazing lands of the household in tonnes over covariates household grazing land size and number of households' livestock in TLU for each type of livestock's. The following variables with the corresponding P-value in the bracket were found to have a significant effect over the dependent variable Dry matter yield of grazing land. Household grazing land size in hectare (< 0.0001), Number of household livestock in TLU for horse (0.03), mature female donkey (0.04), and for dairy cows (0.07). Models were fitted for crop residues dry matter yield and aftermaths of the households including utilization efficiency and all were significant.

Livestock feed balance in terms of dry matter yield showed that a total of 1224.6 tonnes of dry matter are produced for a total TLU values of 1128.2 making their ratio to 1.09 but in actuality 3178 tonnes of dry matter is required for the surveyed existing stocks regardless of the nutritional content of the dry matter. Quantification estimate clearly showed that the time of abundant feeds availability in the *woreda* is only five months. Seasonal variation of feed is high and efficient utilizations of what is produced is still quite less than 65% because of non-storage of crop residues during crop harvest, wastage by trampling, lack of improvement of the quality of the feed and dumping the crop residues off.

Plots of private grazing lands in front of homestead are usually the main sources of feeds for livestock, during cultivation and hence are over grazed. Nearly 64 % of the surveyed households have problems of shortages of water and travel from half- a day during dry period. High production of crop residues dry matter that make the two systems complement to one another, locally available sodic soil of the area called bole in addition to better livestock market out let is an existing opportunity. Forage development is a key to skip feed shortages if practiced but it is at an infant stage in terms of usage in the study areas and the main reasons of which are highly attributed to shortage of land, seed and knowledge gap. Interventions to utilize locally available potential feeds, better access to forage and fodder development, water development and quality improvement of straws are optioned as a way out to profit from the livestock sector in the study areas. Nevertheless, these are not only enough unless backed up institutionally as a strategy for consistent and persistent monitoring.

Characterization of Bonga and Horro indigenous sheep breeds of smallholders for designing community based breeding strategies in Ethiopia

Zewdu Edea
Haramaya University, Ethiopia

Abstract: In the framework of designing community-based breeding strategies for indigenous sheep breeds of smallholders in Ethiopia, a survey of production system and on-farm characterization of Horro and Bonga sheep breeds, was undertaken in the Horro and Adiyo Kaka districts, respectively. Purposive and random sampling was employed as sampling technique. Detailed structured questionnaires, focus group discussions, field observations of animals, body measurements, and secondary data collection were employed to produce the data. Body weight, linear body measurements, and qualitative records were taken and observed from 762 Bonga sheep and 816 Horro sheep. For the analyses of quantitative data, the main effects of breed and dentition were fitted to the model within each sex groups. Results revealed that the mean flock sizes for Adiyo Kaka and Horro districts were 11.28 ± 1.27 and 8.20 ± 2.05, respectively. Sheep have multi-purpose roles in both production systems. Among the reasons for keeping sheep, source of income was ranked highest. Age at first lambing for Bonga and Horro sheep was 14.9 ± 3.1 and 13.3 ± 1.7 months, respectively. Average lambing intervals were 8.9 ± 2.1 and 9.2 ± 2.4 months, for Bonga and Horro, respectively. Disease, feed shortage, and predators were the most pertinent constraints for sheep production in that order for farmers in Horro. In Adiyo Kaka, disease, labor shortage, predators were ranked as first, second and third based upon their significant influence on sheep productivity. The mean body weight, body length, chest girth, wither height, tail circumference and tail length for Bonga females were 31.87 ± 0.19 kg, 69.16 ± 0.15 cm, 72.92 ± 0.17 cm, 68.12 ± 0.14 cm, 15.92 ± 0.30 cm and 32.07 ± 0.37 cm, respectively. The corresponding values for males of the same breed were 29.70 ± 1.17 kg, 68.27 ± 0.89 cm, 70.0 ± 1.026 cm, 66.53 ± 0.85 cm, 20.85 ± 0.97 cm and 35.40 ± 0.96 cm, respectively. For Horro females, the values in the same order were 27.65 ± 0.21, 67.40 ± 0.164 cm, 73.81 ± 0.19 cm, 69.43 ± 0.16 cm, 16.08 ± 0.15 cm and 37.52 ± 0.95, respectively. The values of the measurements for males, on the other hand,

were 31.66 ± 1.23 kg, 69.30 ± 0.94 cm, 76.12 ± 1.08 cm, 71.66 ± 0.90 cm, 23.46 ± 0.97 cm and 37.52 ± 0.95 cm, respectively. Within each sex, it was found that breed had significant effect on live body weight and most of the body measurements. Accordingly, Horro females had significantly (P<0.01) greater values for chest girth, wither height and tail length than Bonga females. On the contrary, Bonga ewe's had significantly (P<0.01) higher values than Horro with respect to body weight, body length, chest width, pelvic width and ear length. Horro male had higher values (P< 0.01) for chest girth; wither height and scrotal circumference than Bonga males. With the exceptions of ear length, tail circumference, tail length and body condition score, within the range of age studied, age was found to have a significant influence (P< 0.01) on most body measurements in females. The mean body weight and body measurements of animals at dentition 1 and 2 were significantly lower than those of the dentition class 3 to 4-years-old sheep. The correlations between body weights and body measurements at different ages were positive and significant (P<0.01). The highest correlation coefficient was found between body weight and chest girth in both of the breeds, sexes, and age groups. The regression analysis to predict body weight from linear measurements indicated that body weight, in most of the cases, could be predicted with a higher level of accuracy from more than one independent trait. However, for practical point of view, the use of chest girth as estimator variable for body weight was suggested due to ease of measurement under farmers' conditions. To realize full benefits of the forthcoming breeding strategies, concurrent improvement in the non-genetic factors (disease and feed) is central.

www.ilri.org

headquarters
box   30709 Nairobi 00100, Kenya
phone +254 20 422 3000
fax   +254 20 422 3001
email ilri-kenya@cgiar.org

principal site
box   5689, Addis Ababa, Ethiopia
phone +251 11 617 2000
fax   +251 11 617 2001
email ilri-ethiopia@cgiar.org

ILRI via USA direct
phone +1 650 833 6660
fax   +1 650 833 6661