PROVIDING RESEARCH METHODS SUPPORT TO THE MARKETS THEME DEPARTMENT OF THE INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE (ILRI)

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DECLARATION

This dissertation is my original work and has not been presented for a degree in any other university.

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This dissertation is submitted with our knowledge as university supervisors:

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DEDICATION

To my dear parents Thelma Mary Kalima and Evans Simpande Moono, my brother Siampongo and sister Mumba for the love, care and encouragement.

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LIST OF ABBREVIATIONS

ABS	African Breeders Service
EADD	East Africa Dairy Development
GEF	Global Environment Facility
ICRAF	World Agroforestry Centre
ILRI	International Livestock Research Institute
JKUAT	Jomo Kenyatta University of Agriculture and Technology
MTE	Mid Term Evaluation
RUFORUM	Regional Universities Forum for Capacity Building in Agriculture
SSC	Statistical Services Centre
TNS	TechnoServe

ABSTRACT

The dissertation describes the main activities carried out during the attachment at the International livestock Research Institute (ILRI) in Nairobi, Kenya under the Markets theme group. The activities were carried out under two projects that were ongoing the East Africa Dairy Development (EADD) and the Global Environment Facility in Asia (GEF- Asia). The main objective of the attachment was to support scientists and consolidate skills in the planning, implementation and reporting of effective research for development. A training course on the use of GenStat statistical software in data management and statistical analysis of qualitative survey data was conducted for the GEF-Asia project. Data management involved cleaning, organizing and extracting variables for the baseline household survey data using the GenStat statistical package. The main activity in the EADD project was analysis of the mid-term evaluation (MTE) and baseline household survey data in the three EADD countries (Kenya, Rwanda and Uganda). Data analysis included exploring, summarizing, describing and reporting of the results. Other tasks that were carried out during the attachment included assisting in designing of survey instruments and training of field staff in Uganda. The training was on the sampling of the farmers supplying milk to EADD, use of the questionnaire, importance of data quality and collection techniques. The outputs from the different tasks were used to produce ILRI reports to the two projects.

CHAPTER ONE

1.0 INTRODUCTION

The Masters Research Methodology research attachment was carried out at the International Livestock Research Institute (ILRI) in Nairobi, Kenya under the Markets themes group. The research attachment started from 8th November, 2010 to 16th September 2011, working under two projects that were currently on going the East Africa Dairy Development (EADD) and the Global Environment Facility in Asia (GEF-Asia). The objective of the attachment was to provide research support for one or more research projects to gain experience of support for all stages of planning, data collection and organisation, analysis and reporting of a project cycle. The experiences were enhance the ability to offer support services in research methods.

1.1 East Africa Dairy Development (EADD) Project

The East Africa Dairy Development (EADD) project is a regional industry development program that is funded by the Bill and Melinda Gates foundation. The project was started in December 2007 and is still active till December 2011. The EADD project is being implemented in three countries namely Kenya, Rwanda and Uganda. Heifer International Project in partnership with International Livestock Research Institute (ILRI), Techno Serve (TNS), the World Agroforestry Centre (ICRAF) and the African Breeders Service (ABS) Total Cattle Management are leading the program.

The main goal of the project is to help one million people in 179,000 families living on 1-5 acre farms lift themselves out of poverty through more profitable production and marketing of milk (EADD, 2010). The main role of ILRI in the EADD project is to

conduct baseline surveys, informing design of improved feeding strategies, conducting breeding assessment studies, informing the design of the "traditional hubs" (hub without chilling plant), leading the impact assessment modeling (direct and indirect effects), drawing strategic lessons for future project up-scaling and providing regular recommendations on project activities based on research outputs.

The project is organizing farmers into cooperative groups to pool resources and buy milk cooling facilities, improve animal breeds, improve fodder and train farmers how to better manage their milk business. In the past two years of the project's implementation, changes in attitude among dairy farmers have led to economic benefits that are improving the livelihoods of East Africa's small-scale dairy producers (Karaimu, 2010).

1.2 Global Environment Facility (GEF) Asia Project

The Global Environment Facility (GEF) was established in 1991, the organisation unites 182 member governments in partnership with international institutions, non-governmental organizations, and the private sector to address global environmental issues (what is gef, 2010). The ILRI-led and GEF-funded US$6.4-million Farm Animal Genetic Resources Project was started in 2009 to better conserve local breeds of chickens, goats and pigs that help sustain the livelihoods of poor farmers and the health and well-being of women and children in Asia. The Farm Animal Genetic Resource Project works to encourage wider use of local breeds, such as the Bengal goat in Bangladesh. The partner countries in the project are Bangladesh, Pakistan, Sri Lanka and Vietnam. The project has focused on three species namely chicken, goat and pig. Each of the four countries where the project is implemented has a long history of use of indigenous livestock and a rich diversity of animals, including the wild relatives of domestic livestock, which provide additional genetic resources for breeding programs to improve domestic animals.

The Animal Genetic Resources Project has so far developed baseline survey tools for assessing animal genetic biodiversity and constraints to its conservation with the help of the input from farmers, researchers and development agents and local actors. The tools are also to be used in assessing marketing opportunities for indigenous animals and the contributions these animals make to rural livelihoods. The project has also developed a flock and herd monitoring tool that helps to measure genetic and phenotypic diversity, to track genetic changes in livestock populations over time, and to capture the relations between indigenous domesticated animals and their wild relatives (Karaimu, 2010).

1.3 Problem statement and justification

Africa has realized the role research plays in development. Despite the awareness of the role of research in facilitating development, progress towards the desired targets has been slow (Building Research Capacity African Universities, 2011). Some of the reasons for the slow progress in Africa is much of the research carried out is externally driven and therefore has limited relevance and impact in the countries where it takes place Building Research Capacity African Universities, 2011). There is a limited capacity to conduct research that leads to development of appropriate technology and a favorable policy environment (RUFORUM, 2010). The limited capacity and inadequate support to the changing priorities of agricultural research, natural resource management and socio-sciences research has unfortunately weakened the quality of research and progress towards increasing food and nutritional security and alleviating poverty in the continent (RUFORUM, 2010). The failure of developing countries to finance their own research and hence determine their own research agenda are many other reasons. This has in turn affected the quality of research which can be attributed to the poor planning, procedures and the processes that are involved in the research**.**

Research support to the research institutions will enable consolidate the research methods skills in planning, designing and conducting developmental research. It will provide an opportunity to follow-up on important research leads and support orientation to work with communities. The involvement of African students in on-going research activities will build the needed internal research capacity try and fill the gap in capacity in research methods in the region.

1.4 Objectives

1.4.1 General objective

To support scientists and consolidate skills in the planning, implementation and reporting of effective research for development in the Markets Theme at International Livestock Research Institute.

1.4.2 Specific objectives

I. To conduct trainings in use of GenStat statistical software to GEF-Asia researchers

II. To organize and manage data collected in the two projects using the current tools at the host institutions

III. To analyze, interpret, summarize and report data generated from the projects that will support researchers and scientists' research work

IV. To design survey instruments for the cost of milk production survey and train field staff in data collection

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Training for capacity building in an organisation

Training is the process of enhancing the skills, capabilities and knowledge of employees for doing a particular job. Training process molds the thinking of employees and leads to quality performance of employees (management study guide.com, 1998). Training is essential not only to increase productivity but also to motivate and inspire workers by letting them know how important their jobs are and giving them all the information they need to perform those jobs (Anonymous, 1998). Training is important in increasing productivity as observed in a study undertaken by Bartel (2008) which established a link between employee training and productivity.

The principal objective of training is to make sure the availability of a skilled and willing workforce to an organization. Trainings help employees in achieving their personal goals, which in turn, enhances the individual contribution to an organization. They also assist the organization with its primary objective by bringing individual effectiveness and maintain the department's contribution at a level suitable to the organization's needs (Scribd, 2011). To make training a success, it must be matched directly to the needs of the organization and people in it. Another ingredient for success of training is giving support after training (Rosner, 1999).

In research work, the training events have been found to be effective in helping to introduce new ideas, principles and methods into the researchers' frame of reference (Henning and Chafik, 2001). A training needs assessment is one of the most basic and

common forms of assessment that can be used in the workplace (Gupta, 1999). Some organizational and individual training needs are not as clearly defined as others even when training needs appear to be obvious, it is still necessary to choose appropriate methods that will meet them (McClelland, 2002). The fundamental premise of needs assessment is that in order to make effective decisions about current or future training needs, data must first be gathered (Gupta, 1999). The commonly used methods in collecting the data are interviews, focus groups, surveys and questionnaires, and observation. Other methods include the nominal group technique, action research, and Dacum (developing a curriculum). Most needs assessments employ one or several data-gathering techniques (Gupta, 1999).

The modern concept of capacity-building recognizes that it goes beyond simple training to include development at individual, organizational and institutional levels (Mentz, 1997). This involves encouraging staff to try out new things, take risks and rewarding them for innovative practice. It requires staff to dedicate time to reflect on experience and document lessons learned, particularly in terms of relationships with other partners. It also requires an active knowledge-management policy to make sure the lessons learned are incorporated within organizational practice, and made available to other organizations (Mayne, 2008). As well as utilizing opportunities for formal professional development (degrees and short courses), individual competencies can be improved through induction programmes and mentoring for new staff or work teams, and embedding continued learning into ongoing projects and activities (Hawkins et al., 2009).

2.2 Statistical Consulting

Statistical consulting is defined as the collaborations of a statistician with another professional for the purpose of devising solutions to research problems (Kirk, 1991). Statistical consulting is a complex activity that requires both statistical and non-statistical

skills. These skills determine the ultimate success of the consultation (Douglas et al., 1983). The process of statistical consultations with the client involves five stages as described McCullough et al., (1985). These include; establishing a rapport, identifying the research problem, setting goals, agreeing on a division of responsibility and reviewing what has occurred. According to Douglas et al., (1983), each part of the stages in the statistical consultancy gives rise to specfic issues that requires the consultant to have various nonstatistical skills to deal with such issues.

Establishing a rapport with the client is the first stage in the statistical consultation which allays a clients apprehension by exhibiting an accepting, caring attitude that will encourage an open exchange of information. Secondly, identifying the research problem follows after establishing a rapport. The client at this stage does most of the talking and the consultant listens and asks questions where necessary to clarify some points. It is very important to understand the significance of the clients research and and how it fits into the knowledge of a discipline during this stage (Kirk, 1991). It is also important at this stage that the consultant must obtain accurate and relatively complete understanding of the aspects of the research that have implications for its design and analysis. The third stage involves setting the goals to determine the actions to be undertaken and the questions to be answered after the consultant has a good understanding of the project. In the case of complex project the consultant may bring the third stage to a close and ask more time to think more about the project, where possible the site may be visited and he may also work with the colleagues with whom the project can be discussed. Agreeing on a division of responsibility between the consultant and the client can be reached once agreements have been reached on the actions to be taken and the research questions to be answered. At this stage of consultancy the client and the consultant need to discuss and reach an agreement on their excpectations on what each will do, when it will be done and how much it will cost.

Successful statitical consultancy requires both statistical skills and interpersonal skills as asserted by Stinnett (1988). Statistical consulting involves many aspects typically not covered by statistical educational programs (Kenett and Thyregod, 2006). In the Encyclopedia of Statistical Sciences (Kotz et al., 2005), Brian Joiner stated that for a statistical consultant to be fully effective one should have many diverse skills. The skills required include having a genuine desire to solve real problems and helping others to solve problems. Other skills include being able to listen carefully, having a broad knowledge and true understanding of statistical and scientific methods, locating or developing good statistical procedures and to ask probing questions. Much success in consulting depends on being able to help others understand statistical tools and their strengths and weaknesses (Kotz et al., 2005).

2.3 Data organisation and management

The scientific process is enhanced by managing and sharing research data. Good data management practice allows reliable verification of results and permits new and innovative research built on existing information (Veerle et al., 2009). Data refers to qualitative or quantitative attributes of a variable or set of variables. Muraya et al., (2003) defined data management as any activity concerned with looking after and processing this information which includes looking after field data sheets, entering the data into computer files, checking data, preparing for analysis, maintaining records of the processing steps and archiving the data for future use.

Data management ensures that data that is used for analysis and reaching conclusions is correct and lack of proper management of the data may result into serious mistakes in the processing, resulting in incorrect conclusions. Data cleaning involves the process of detecting and the removing errors and inconsistencies from data in order to improve the

quality of data (Rahm and Hong, 2001). The approach should be supported by tools to limit manual inspection and programming effort and be extensible to easily cover additional sources (Rahm and Hong 2001).

Accuracy is therefore paramount and errors resulting from wrong data entry, incorrect methods of conversion and combining numbers must be avoided (Muraya et al., 2003). Some of the common errors that go undetected if there is no attention paid to data management include confusing variables and datasets, errors in data entry and incorrect methods of converting and combining numbers.

Well managed data reduces the time for preparing the data for the statistics, modelling and mapping. Data management includes converting the data to suitable formats, merging data originally entered in different files and producing various summaries and conversions from raw field measurements. Data has to be documented and described for it to make sense to the researcher who collected it and to others who may want to use the data. Field data is expensive to collect so must be considered as valuable, but its value is maintained only if it can be used in the future (Chege and Muraya, 2004).

Data management involves the following steps planning data management for a project, taking into account the objectives and planned outputs, the resources and skills available. Designing field data recording sheets, collection of data, checking of raw data, data entry and organization of computer files are some of the steps that are involved in data management process. The backing up of data files, processing and checking of data for analysis, maintenance of a data processing log and archiving data for future use constitute data management process.

Making data available to other scientists is not a new idea, but having that data available on the Internet in a searchable format has revolutionized the way that scientists can interact with the data, allowing for research efforts that would have been impossible before (Egger and Carpi, 2008). This collective pooling of data also allows for new kinds of analysis and interpretation on global scales and over long periods of time. In addition, making data easily accessible helps promote interdisciplinary research by opening the doors to exploration by diverse scientists in many fields.

Data mining is also another important topic regarding data management. This is a process in which large amounts of data are sifted through to show trends, relationships and patterns. Data mining exposes interesting information about the data being collected which is analyzed and formatted where specialists can then make quality decisions based upon it. Good data is a potential treasure trove it can be mined by scientists at any time and thus an important part of any scientific investigation is accurate and consistent recording of data and the methods used to collect that data (Egger and Carpi, 2008).

2.4 Data analysis

Data analysis involves the inspection, cleaning, transforming, and modeling of the data in order to obtain information, come up with conclusions and helping decision making. Before any data analysis is done the data needs to be inspected and where possible erroneous data is corrected. Data cleaning and checking is done during the stage of data entry. The guiding principle provided by Adèr and Mellenbergh (2008) is that during subsequent manipulations of the data, information should always be cumulatively retrievable. It should always be possible to undo any data set alterations. It is therefore important to keep all information at any stage in the data cleaning process and all information should be saved this includes both the original values and the new values should be kept either in a duplicate dataset or under a different variable name and all

alterations to the data set should carefully and clearly documented for instance in a syntax or a log (Adèr and Mellenbergh, 2010).

During initial data analysis the quality of the data should be checked as early as possible using different types of analyses for example descriptive statistics (mean, standard deviation, median), frequency counts, normality (skewness, kurtosis, frequency histograms, normal probability plots) and associations (correlations and scatter plots). The quality of the measurement instruments is also checked during the initial data analysis phase to check whether structure of measurement instruments corresponds to the structure reported in the literature. The measurement quality can be assessed in two ways by carrying out the confirmatory factor analysis and analysis of homogeneity which gives an indication of the reliability of a measurement instrument. During this analysis, one inspects the variances of the items and the scales, the Cronbach's α of the scales, and the change in the Cronbach's alpha when an item would be deleted from a scalePossible transformations of variables are done after assessing the quality of the data and of the measurements. Log-transformation can be done if the distribution differs substantially from normal, Square root transformation if the distribution differs moderately from normal, inverse transformation if the distribution differs severely from normal and make variables categorical (ordinal or dichotomous) if the distribution differs severely from normal and no transformations help. Other possible data distortions that should be checked are randomization, dropout, nonresponse (whether this is random or not should be assessed during the initial data analysis phase and treatment quality (using manipulation checks). It is also very important to describe and determine the structure of the sample accurately especially when subgroup analyses will be performed during the main analysis phase. The characteristics of the data sample can be assessed by looking at the scatter plots, cross tabulations, correlations and basic statistics of important variables.

Documentation of the findings of the initial data analysis is necessary for possible corrective actions to the original plan for the main data analyses. Adèr (2008) suggests that several decisions about the main data analyses can and should be made in the case of non-normal, missing data, items do not fit the scale and where the randomization procedure seems to be defective.

The main data analysis involves describing the data (Descriptive Statistics) and testing Hypotheses and Models (Inferential Statistics). Descriptive statistics are used to describe the basic features of the data and they provide simple summaries. The descriptive statistics simply describes what is or what the data shows. Inferential statistics, on the other hand tries to reach conclusions that extend beyond the immediate data alone. Therefore the inferential statistics makes inferences from our data to more general conditions and the descriptive statistics to describe what is going on in our data.

The data obtained from a study may or may not be in numerical or quantitative form, that is, in the form of numbers. If they are not in numerical form for example in qualitative research the information obtained from participants is not expressed in numerical form. The emphasis is on the stated experiences of the participants and on the stated meanings they attach to themselves, to other people, and to their environment. Qualitative analysis can be carried out based on the experiences of the individual participants. If the data are in numerical form in quantitative research then some descriptive statistics to summarize the pattern of findings can be carried out (Reason and Rowan, 1981).

A key principle of qualitative analysis is that theoretical understanding emerges from the data and is not imposed by the researcher. Qualitative researchers typically categorize the data after taking account of all of the data and of the participants' own categories. Findings based on qualitative data tend to be unreliable and hard to replicate. It can be hard to interpret the information obtained from interviews because of social desirability

bias, complex interactional processes and the self-fulfilling prophecy. There are various ways in which qualitative researchers try to show that their findings are reliable (Coolican, 1994). Probably the most satisfactory approach is to see whether the findings obtained from a qualitative analysis can be replicated. This can be done by comparing the findings from an interview study with those from an observational study. Alternatively, two different qualitative researchers can conduct independent analyses of the same qualitative data, and then compare their findings. The greatest danger with case studies is drawing very general conclusions from a single atypical individual. Case studies can suggest hypotheses, which can then be tested with larger groups. The findings of observational studies are often difficult to interpret, because it is not clear why the participants are behaving as they are. In addition, the participants in observational studies may not be representative.

The mean is the most generally useful measure of central tendency quantitative data analysis, but other measures include the median and mode. The other most useful measure of dispersion is the standard deviation. Other measures include the range and the variation ratio. Summary data from a study can be presented in the form of a figure, so that it is easy to observe general trends (Eysenck, 2004). Among the possible ways of presenting the data in observations, interviews and case studies is by using frequency polygon, histogram and bar chart. Experimental validity is based on the extent to which a given finding is genuine and is due to the independent variable that was manipulated. A study is most likely to be high in experimental validity when all the principles of experimental design (e.g. randomization standardization) have been followed. Replication provides some assurance that experimental validity is high.

The role of government has expanded to affect almost every aspect of people's daily lives and the role of statistics in shaping governmental policies has expanded as observed by Klass (2008). This is to an extent the public lacks the skills to critically evaluate the

statistical analyses that shape public policy more crucial decisions that affect our daily lives will be made by technocrats who have these statistical skills or by those who would use their mastery of these skills to serve their own partisan or special interest (Klass, 2008).

2.5 Communication and Team work

Communication skills do not occur automatically, they need to be developed in order to communicate effectively. A person's ability to communicate effectively may also come from experience. While there are many skills that are necessary for success, communication skills are among the most important. Don (2008) stated that communication skills can make or break a career. A person may have brilliant ideas in his mind, but unless they are communicated to others, it is not possible to implement that idea and it is also difficult to finish all the tasks on one's own.

Good communication skills are an added advantage and people with good communication skills are an asset to any organization. Good communication and teamwork go hand in hand; it provides a means for the exchange of information among team members (Pinto and Pinto, 1990). Communication determines how information is gathered and how it is given back, how problems are solved, decisions are made, how agreements are reached and resolving disagreements. The ability to communicate has a direct bearing on one's friendships, promotion, pay raises, responsibilities, career paths and it directly affects the level of support and help one receives from others (Gandhi, 2010).

Projects in many organizations and institutions require team work across different disciplines. Working in teams has benefits, for example formation of new friendships and

equal distribution of work. Informal and spontaneous communication has shown to be crucial to the work of teams with innovative projects because ideas and contributions can be shared, discussed, and evaluated with other team members more quickly and efficiently (Katz, 1982; Pinto and Pinto, 1990; Brodbeck, 1994 ; Domsch and Gerpott, 1995). In addition, Hoegl and Gemuenden (2001) stated that it is important to the quality of collaboration in teams that team members be able to communicate directly with all other team members (communication structure) because the exchange of information through mediators such as team leader is time consuming and a possible cause of faulty transmission.

Communication is essential for team work and creates a shared understanding of the tasks at hand and ensures that all the members possess the required and precise information needed according to Spielberger (2004). Without effective communication in team efforts, tension and stress among its members may arise. Problems can come about when deadlines are not met and some of the members of the team are not doing their work. However, most problems can be solved or prevented among members with effective communication which involves open-mindedness, active listening and the ability to focus (Bihm, 2010).

It is widely agreed upon in the literature that the flow of communication within teams influences the success of innovative projects (Griffin and Hauser, 1992). Research by Katz and Allen (1988), involving fifty research and development teams, demonstrated a strong positive impact of within team communication on project success. In a study by Hauptman and Hirji (1996), their investigation on fifty cross-functional project teams showed that frequent two-way communication within teams exerts a positive influence on team performance**.**

2.6 Conceptual framework

Figure 1 provides a conceptual framework summarising the aspects involved and the way they interconnect. The main objective was to support scientists and consolidate skills in the planning, implementation and reporting of effective research for development in the Markets Theme at International Livestock Research Institute which will in turn help build the needed research capacity in research methods. The outcome of the research attachment was largely dependant on the availability of resources, the support of the team members and the available work at the host institution. With the concerted efforts of the department and planning the outputs were yielded.

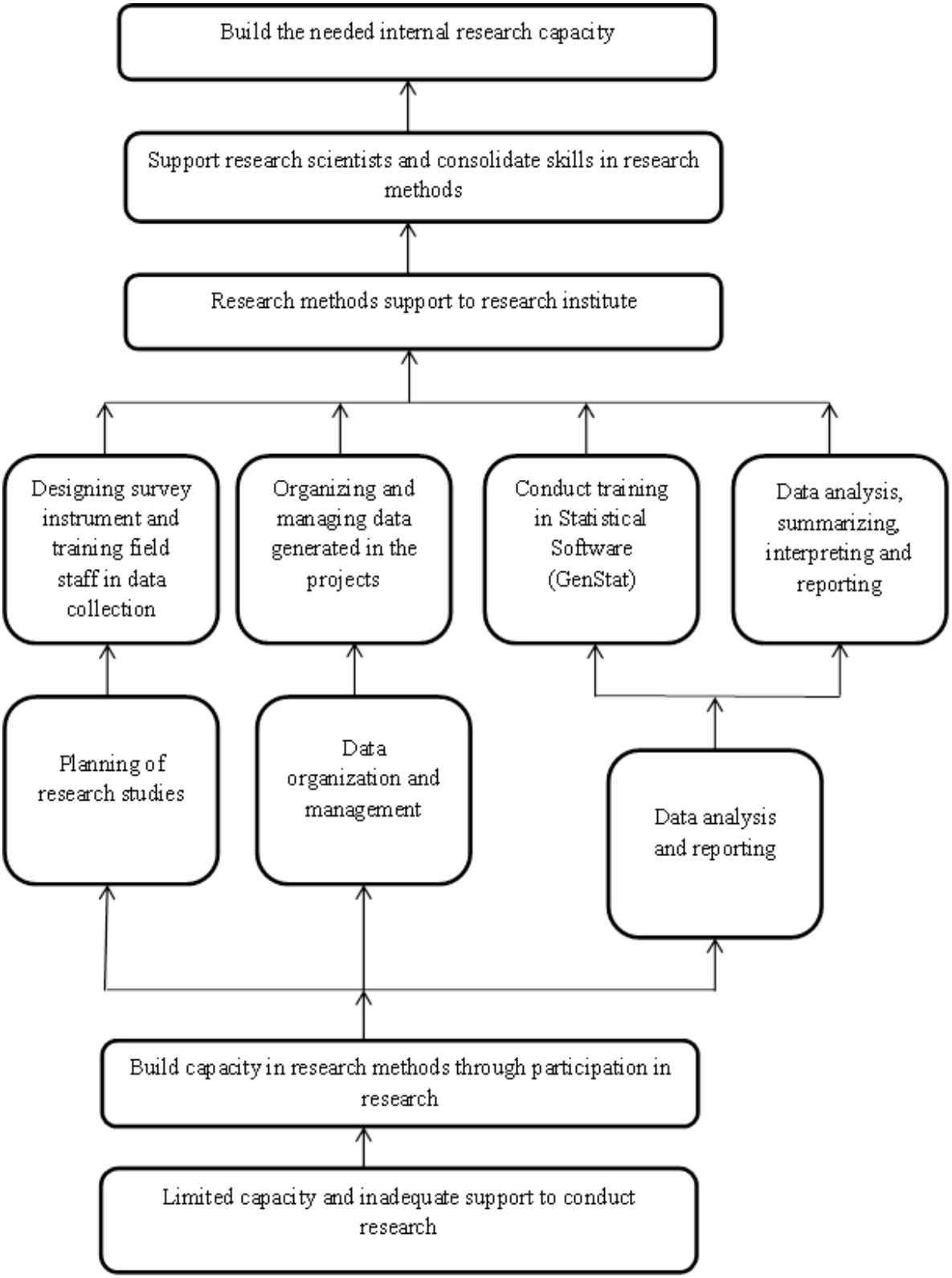

Figure 1: Conceptual framework for research methods support at ILRI

CHAPTER THREE

3.0 METHODOLOGY

3.1 Training of researchers on the use of statistical software to support scientific writing and publications

3.1.1 Training on the use of GenStat statistical software

A one day short training course on the use of GenStat statistical software in data management and statistical analysis of qualitative survey data was successfully conducted at ILRI. The training course was offered to GEF- Asia researchers from Sri Lanka, Bangladesh and Vietnam. The first training of two researchers from Sri Lanka and Bangladesh was conducted on November 12th, 2010. Second training for the researcher from Vietnam was conducted later on January 12th, 2011. The main objective of the training was to prepare the researchers for data analysis for the first GEF- Asia project baseline draft report for each of the three GEF Asia countries. The specific objectives included to enable the researchers to know the basic use of the GenStat menus, describe any data set that is well-organized and of acceptable quality in ways that correspond to the stated objectives of the study, make statistically valid generalizations of the findings and to provide support to data analysis.

The GenStat statistical software was firstly installed on the laptops of the trainees. Short presentations were conducted using Microsoft PowerPoint followed by practical sessions after each short presentation (Appendix 1). The students were then handed with the presentation notes and resources for further practice. The training was afterwards evaluated by the trainees using short evaluation questionnaires (Appendix 2). The course evaluation questionnaires collected data on the course impact, general information on the

standard of teaching, quality of the resources and the level of understanding of the trainees.

3.1.2 Research consultancy

Statistical consultancy with the GEF- Asia researchers after the training continued with the help of the host institution supervisor. A meeting was held with the GEF- Asia researchers and the ILRI project supervisors to come with the outline of the baseline draft report which was to be the standard report for all the three countries. The tasks in the consultancy involved developing the baseline draft report, extracting variables from the Microsoft Access database that were to be used in data analysis, data management and running the data analysis in GenStat, helping out with data analysis problems and filling up the tables in the baseline survey draft report.

3.2 Participation in data organization and management

The GEF Asia baseline data for Sri Lanka, Bangladesh and Vietnam was cleaned and organized before the data analysis using the GenStat statistical package. During the data cleaning and verification, the variables to be used in the data analysis for the baseline draft reports were extracted from Microsoft Access database and exported to Excel spreadsheet. The Data in the Excel spreadsheet was then imported into GenStat for further data manipulation and analysis.

3.3 Data analysis and reporting of results

The data analysed during the attachment was the EADD baseline household survey data that was collected in 2008 and EADD midterm evaluation (MTE) data for 2009.The main statistical package used in the management and analysis of the data was Stata statistical package and SPSS to a smaller extent.

3.3.1 Sampling strategy for the Baseline and MTE surveys

The baseline survey had two main purposes; to assess the farmers and community's situation before the project starts and to identify key constraints farmers and other agents face, as well as their opportunities. This was to help guide project development interventions (ILRI, 2009). In the baseline survey, the project sites/ hubs were classified into four recommendation domains according to the climatic characteristic (high/ low) and access to urban centre (high/ low). At least one site was selected from each domain and in total 1/3 to 1/4 of the entire project sites (5 in Kenya and Uganda and 3 in Rwanda) were surveyed to capture site variability. Seventy five households were randomly selected within a certain radius (20km for Kenya and Uganda and 10km for Rwanda) which defined the catchment area in each site.

During the MTE, four sites representing each of the recommendation domains were selected except Rwanda where the only low access/ high production potential (LH) site was substituted by a low access/low production potential (LL) because of political problems. A total of 720 households composed of project beneficiaries (288 hh) non-beneficiaries (192 hh) and control (240 hh), were identified from each site. The purpose of the MTE was to review the progress of the project in relation to baseline, project objectives and its vision of success. Based on the review of progress, challenges,

strengths and weaknesses. The MTE intends to improve project planning and implementation, make recommendations for any necessary changes in the overall design and orientation of the project and make detailed recommendations on the work plan for the remainder of the project implementation period (TANGO International, 2010).

3.3.2 Monitoring and Evaluation: Comparison of EADD baseline and mid-term evaluation (MTE) data

Comparisons were made between the MTE and the baseline data during the data analysis task. The data analysis objectives were to understand the kind of farmers registered with EADD and what kinds participate actively from the MTE data. The other objective was to differentiate the three categories of farmers (EADD, non EADD in catchment area and control households) and the baseline data. The variables compared included land size, herd size, percentage of farmers with grade cattle, assets, family labour availability, farmer's education, female headed households and whether household head had off farm income. The percentage of farmers actively participating in EADD that is those selling milk and/or using inputs or services at the hub was to be calculated. Amongst EADD active participants the poor households were to be identified and also what makes them different from the other poor who do not participate was to be determined. The analysis done on the stated variables was used to produce the report on Lessons from Mid Term Evaluation Data which is one of the ILRI reports to EADD project.

3.3.3 Proxy variables to identify poor farmers in the field

Poverty being dynamic and multifaceted, a comprehensive approach needed to be adopted in targeting the poor with development services. EADD initially used the conventional <US$ 2 approach in targeting the poor farmers an approach that did not

capture the different dimensions of poverty. Thus a different approach that identifies factors that are significant in explaining probability of being poor or not in Kenya, Uganda and Rwanda was being proposed. Proxy variables to be used in the field to identify poor farmers in the field were determined using the EADD- Baseline data. Correlations and regression analysis were performed using Stata statistical software on the household and farm assets, landholding, labor, and social factors such as gender (sex), household head age, household head school years, number of children and household size variables. The logistic regression was run with the probability of being poor or not poor under Purchasing power parity (PPP) rate being the dependent variable and the set of independent variables that capture the various dimensions of poverty classified into wealth (assets), socioeconomics and expenditure. For the continuous variables such as the household head years of schooling and the land owned, dummy variables were created before running the logistic regressions guided by the 75^{th} percentile. The Factor analysis was performed using SPSS and four components were extracted. Sets of variables that loaded on a particular component were identified and used to validate the results by identifying common themes among them.

3.3.4 Milk Production and gross margin per household for each site in Uganda

ILRI proposed to develop a study that would look at the traditional market (TM) hubs in Uganda, to understand how they have differential impacts in poor households and on child nutrition, compared to the chilling plant (CP) hubs. The topic was the impact of including traditional hubs in the EADD Project in Uganda. Surveys would be conducted on a sample of hubs and some of the household associated with them which would address several parameters. Milk production and productivity were some of the parameters to be addressed in the survey.

To prepare the proposal information was required from the baseline survey on milk production and the gross margin. The data analysis objectives were to determine the baseline annual gross margin and milk production per household for each site in Uganda and to calculate the intra-site correlation on milk production and the gross margins. The descriptive statistics which include the mean, standard deviation and total number of households were tabulated and then the large one way analysis of variance was run to obtain the intra- cluster correlation coefficient for the specified site in Uganda.

3.3.5 Evidence of adoption and emerging technologies

The ILRI impact assessment task force was asked to give some recent examples of technology adoption in Africa, with specific reference to livestock. The evidence was cited from the EADD baseline about intensification in general and from the MTE about technology adoption leading to increased production. A brief was prepared to highlight some key results of some technologies adopted in EADD by comparing the baseline survey and the Mid-term evaluation (MTE) using the data from sites that were common to the two surveys. The sites included Luwero and Mukono in Uganda, Kabiyet, Metkei and Siongiroi in Kenya and Bwisanga, Mbare and Kibondo in Rwanda.

The objective of the analysis was to determine the adoption of technologies in different project sites by comparing proportion of farmers that were using the technologies. The technologies under consideration include use of concentrates, fodder crops, artificial insemination, feed conservation practices and adaptation of exotic breeds. The impact of the project on EADD registered and non-EADD farmers was also assessed in the project sites.

The analysis was done using data collected from common baseline and MTE sites without considering the control sites. Since data collection during the MTE was not random and in order to obtain more appropriate comparisons the results are presented at two levels; i) MTE weighted results according to the proportion of farmers in that site registered with EADD/ 'selling to the hub'. Weighting reduces the chance of over-estimating farmers 'selling to the hub' because of low registration rate, and ii) non-weighted estimates of EADD and non-EADD registered farmers.

The percentage uptake of households was calculated using the formula:

*% uptake = (Number of EADD registered / number of Households with cattle)*100 (1)*

Where:

*Number of Households with cattle = total number of households in sites * % households with cattle per site (2)*

The weighted average was therefore obtained using the formula;

$$[(Z/100)*(a_1/n_1) + (100-Z/100)* (b_1/n_1)] *100 \quad (3)$$

Where:

Z = % uptake

$a_{1=}$ number of EADD registered farmers using technology

$b_{1=}$ number of non EADD registered farmers not using technology

$n_{1=}$ Total number of EADD registered farmers with dairy

$n_{2=}$ Total number of non EADD registered farmers with dairy

For the non-weighted estimates of the MTE the results were presented by group (the EADD registered and the EADD non-registered) to give unbiased estimates for each of the two population.

3.4 Designing survey instruments and training field staff in data collection

Under the EADD projects a survey to assess cost of milk production in selected EADD project sites will be carried out in Kenya, Uganda and Rwanda. The study will determine how much it is costing farmers to produce a liter of milk. Comparison will be made among farms, breeds, production systems and countries. The main objective of the survey is to identify areas of intervention in milk production.

Tasks that were carried out during the attachment included assisting in designing of survey instruments and training of field staff in Uganda. The training was on the sampling, use of the questionnaire, data quality and collection techniques. The main objective of the field trip was to participate in the training of the enumerators and the pre-testing exercise of the tools with the trained enumerators at the Kasangati Dairy Cooperative hub.

3.5 Communication and Teamwork

During the attachment communication and teamwork skills were practiced throughout in all aspects of the different tasks. Consultations, planning meetings and discussions were held among team members in order to allocate tasks, work plans and agreements when to expect outputs from each individual member. The objective was to have correct and timely quality outputs and reporting to ILRI partners

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 Training of researchers on the use of statistical software to support scientific writing and publications

4.1.1 Training on the use of GenStat statistical software

The three researchers (two Masters students and One PhD student) were trained on how to use Genstat both for data management and analysis. Plate 1 below is showing two of the researchers trained.

Plate 1: GenStat software training session of GEF – Asia researchers

According to the information collected from the evaluation questionnaire, the course was very useful for the trainees though they stated that it was too demanding. The amount of materials covered, the practical content, the statistical theory and knowledge assumed during the training was too much in their view. The trainees felt more time and practical sessions should have been allocated for effective learning.

During the training sessions the information covered was to give the trainees a foundation in using the statistical package. Two out of three of the trainees had thorough understanding of the introduction, descriptive statistics and statistical modeling in GenStat. The standard of teaching and the quality of the resources provided in the training was rated to be very good and that they would recommend it to other people. The most important element in a training situation is the trainer. Successful training lies almost entirely in the hands of the trainer to ensuring that the trainees achieve the maximum possible from the training.

4.2 Participation in data organization and management

The GEF- Asia household survey data that was already in the Microsoft office Access database was extracted then exported to excel and imported into Genstat. The cleaning and organizing of the data for analysis was done in GenStat statistical package. The challenges faced during consultancy included having no clearly stated objectives for the data analysis. The other challenge was the data from the three countries was not well organized and there were inconsistencies in the way the data was recorded in the database. These challenges were met by exploring ways of cleaning the data in GenStat software and coming up with the data analysis objectives in order to extract the required variables for the data analysis.

4.3 Supporting researchers and scientists in analysing, interpreting, summarising and reporting of results.

4.3.1 Data management and analysis

There are several ways to approach data analysis, and it is easy to manipulate data during the analysis phase to push certain conclusions or agendas. Before data analysis it is always important to have clearly stated data analysis objectives, right datasets and check that the data cleaned. Kumar (2005) also stated that irrespective of the method of data collection, the first step in processing the data is to ensure that the data was clean; free from inconsistencies and incompleteness. Editing is another process which involves scrutinizing the completed research instruments to identify and minimize, as far as possible, errors, incompleteness, misclassification and gaps in information obtained from respondents. Data cleaning is an essential part of data management (Chapman 2005), error prevention is far superior to error detection and cleaning, as it is cheaper and more efficient to prevent errors than to try and find them and correct them later.

The data analyzed was checked, cleaned where possible and the necessary variables to be used in the data analysis were extracted. The data analysis included exploring, summarizing, describing, and using sampled data to inferences to the population. Some of the outputs from the data analysis are presented below:

4.3.2 Monitoring and Evaluation: comparison of EADD baseline and MTE data

The data from the MTE and baseline surveys were compared using the data from sites that were common to the two surveys. These included two out of six sites in Uganda, three out of seven in Kenya and three out of four in Rwanda of the baseline survey sites.

The MTE data showed that the majority of registered farmers who were surveyed were selling milk to hub and/or accessing inputs and services from hub, with higher percentages in Kenya (94%) and lowest in Uganda (67%) (Figure 2). A number of non-registered farmers were also selling milk to hub and/or accessing inputs and services from hub especially in Rwanda.

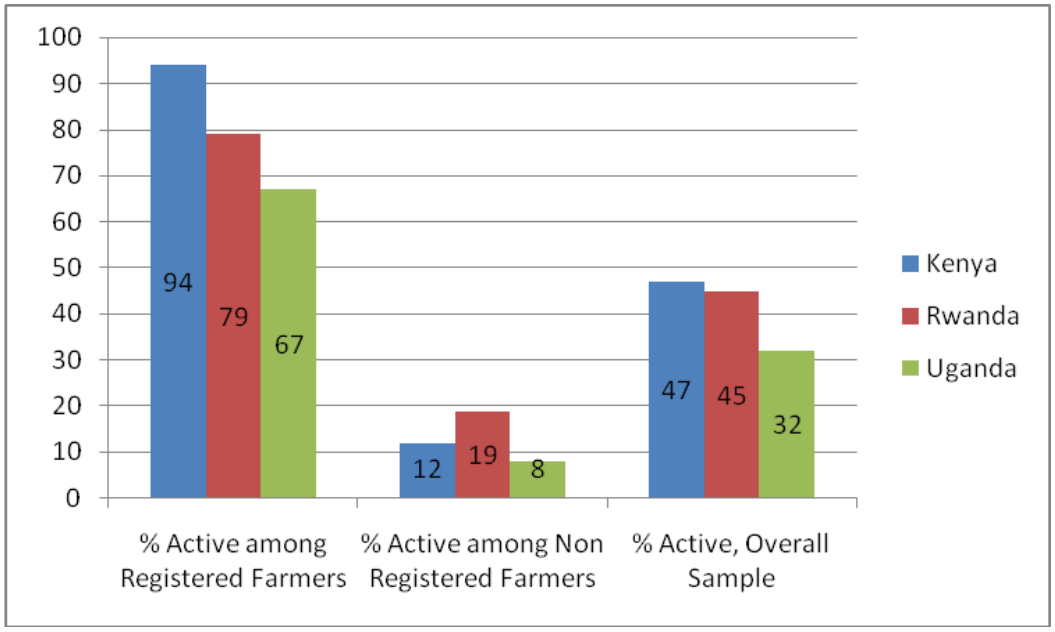

Figure 2: Percentage of active households among registered farmers, non-registered farmers and overall (Source: ILRI Reports to EADD - 2 – 2011, Lessons from Mid Term Evaluation Data)

The MTE data provided interesting insights on poor farmers' participation in EADD activities even though the low numbers of poor and active farmers was a challenge to this analysis. A higher proportion of poor active farmers owned dairy (cross bred or exotic cattle) cows; compared to poor inactive farmers (the difference is statistically significant at 95% only in Kenya). Considering some of the farmer characteristics in catchment and control areas based on income status, the poor active farmers were on average more educated than poor inactive ones (Table 1) . However the difference was only significant in Kenya.

Table 1: Characteristics of poor dairy farmers actively participating in EADD activities versus non-active farmers

	Kenya				Rwanda				Uganda			
	Active poor	Inactive poor	Active rich	Inactive rich	Active poor	Inactive poor	Active rich	Inactive rich	Active poor	Inactive poor	Active rich	Inactive rich
Characteristic	414				75				398			
N	51	94	145	124	5	22	23	25	27	123	97	151
Percentage of households with improved grade cow	100*	73.40	96.55	87.90	40.00	22.70	100.00	88.00	59.26	39.02	71.13	54.96
Percentage of households with Local cow	9.8*	25.53	6.90	12.09	40.00	40.90	43.50	76.00	55.56*	78.86	54.64	59.60
Percentage of household heads with formal education (complete primary education)	74.5*	57.44	78.62	72.58	60.00	36.40	65.20	28.00	51.85	43.90	60.82	44.37
Percent of farmers with technical training	25.49*	6.4	42.1	13.7	80.0*	27.3	100.0	48.0	59.26*	26.8	74.2	38.4

* Significantly different at 95% following two sample proportional test

More educated households were more likely to embrace the concept of hub services (the difference is statistically significant at 95% only in Kenya). In addition a significantly higher proportion of poor active farmers had technical training than the inactive poor farmers. This could be attributed to the trainings organized and provided at the hubs. Such education forum geared towards improved livestock production would intensify reasons for active participation in the hub activities (the difference is statistically significant at 95% in the 3 countries).

4.3.3 Proxy variables to identify poor farmers in the field

Using the baseline data several proxy variables were identified using Logistic regression by country to take into account country differences presented in Table 2.

Table 2: Proxies of poverty status by country

Variable	Kenya	Rwanda	Uganda
Household head education level	Below 9 years	Below 9 years	Below 9 years
Employment of labour	Does not employ	Does not employ	Does not employ
Ownership of mobile phone	Does not own	Does not own	Does not own
Land owned	Owns less than 6 acres	Owns less than 6 acres	Owns less than 50 acres
Ownership of asset	Does not own a spray pump		

Source: ILRI Reports to EADD - 1 – 2011, Poverty levels Indicators

The proxies can be used by field staff when targeting poor people either before recruiting households or they can be used to screen the poor and non poor household if the proxies have already been collected (ILRI, 2011). The only disadvantage of these easily observable indicators is that they cannot be used to compare across sites and countries.

4.3.4 Milk Production and gross margins in Uganda

Table 3 shows summary of statistics milk production per cow per year and milk production per total land unit (TLU) cow per site in Uganda. The average milk produced per cow per year in Uganda was 520.7 litres and a median of 301.8 liters. On average farmers in Mukono had the highest milk production per cow per year (799.5 litres), the lowest average milk produced per cow per year was observed in Kakooge (247 litres). The average milk produced per TLU cow Uganda was 472.9 litres and a median of 276.2 litres. Mukono reported the highest milk production per TLU cow, followed by Masaka (660.8 liters**)** and the lowest in Kakooge (241.6 liters).

Table 3: Milk production per cow per year and milk production per TLU cow

	Milk production per cow per year				Milk production per TLU cow		
Site	N	Mean	Median	Standard deviation	Mean	Median	Standard deviation
Bbaale	34	403.1	288.8	321.9	421.8	264.5	480
Masaka	25	793.6	365	1120.6	660.8	365	767
Mukono	37	799.5	365	952.2	692.7	365	802.6
Kakooge	48	247	162.4	213.2	241.6	162.4	204.5
Total	144	520.7	301.8	734.5	472.9	276.2	604.2

The one way analysis of variance was perfomed for the milk produced per cow per year and the milk produced per TLU cow in the sites. The intraclass correlation milk production per cow per year was 0.12 (R-squared 0.11, 95% confidence interval (0.00, 0.34)) and milk production per TLU cow was 0.11 (R-squared 0.11, 95% confidence interval (0.00, 0.30)) meaning the overall variance for milk production per cow per year represents 12% of the total variance while overall milk production per TLU cow represents 11% of total variance.

Comparing between the gross margins with and without family labour, gross margin with family labour were much lower than without family labour. The results in Table 4 show that the highest gross margin for households with family labour was observed in Kakooge ($220.8) and the lowest in Mukono ($-302.6). For households without family labour the highest average gross margin was again observed in Kakooge ($684.1) and the lowest in Mukono ($-95.4).

Table 4: Gross margins for selected sites in Uganda

		Gross Margins with family labour by site		Gross Margins without family labour by site	
Site	Households with dairy	Mean	Standard deviation	Mean	Standard deviation
Bbaale	34	-30.9	898.6	298.3	826.6
Masaka	25	180.3	364.3	298.8	378.8
Mukono	37	-302.6	1135	-95.4	1134.6
Kakooge	48	220.8	1422.9	684.1	1533.3
Total	144	19.8	1115.3	325.8	1169.5

The one way analysis of variance was perfomed for the gross margin with family and gross margin without family labour. Intracluster correlation for gross margins with family

labour was 0.02, with R-squared of 3.6%, confidence interval of (0.00, 0.10). Gross margin without family labour had intra cluster correlation of 0.006 and the R-squared 0.3%, confidence Interval (0.00, 0.19).

The low intraclass correlations for milk produced and gross margins indicate relatively small between-site variations (Foy, 2001). In other words, sites tend to perform at comparable levels for the two variables. If on the other hand the intraclass correlation increases, then sites perform with ever-increasing variations; some sites producing high milk yields or gross margins and others very high milk yields or gross margins. Therefore for the sampling, in this case low intraclass correlation requires a sample design that focuses more on the within-site component. Thus there is need to devise a design that samples fewer sites, but more households within sites. As the intraclass correlation increases, the focus shifts to sampling more sites, and perhaps fewer households within sites (Foy, 2001).

4.3.5 Evidence of adoption and emerging technologies

The key results of technologies adopted by EADD beneficiaries are highlighted below. The results compare data from baseline survey and the Mid-term evaluation (MTE) common sites. The sites include Luwero and Mukono in Uganda, Kabiyet, Metkei and Siongiroi in Kenya and Bwisanga, Mbare and Kibondo in Rwanda.

4.3.5.1 Adoption of grade cows

The percentage of households with grade cows in the MTE dataset was significantly higher at 95% confidence interval ($p < 0.000$) than in the baseline as shown in Table 5. In

all three countries, an increase in the number of farmers keeping grade cows was observed. In Kenya 93.5% of the cattle keeping households had grade cows, while in Rwanda and Uganda was 61.7% and 63.3% respectively (Table 5). Higher percentages of households that had grade cows were observed in Kabiyet (100%) for Kenya, Mbare (73.4%) in Rwanda and Luwero (69.3%) in Uganda. The main reasons for increase in the use of grade cows by farmers in the MTE were mainly because they wanted to increase the herd sizes and milk production in their dairy enterprise.

Table 5: Weighted Matched MTE and baseline sites in the countries namely Kenya, Rwanda and Uganda

Sites	Numbers of Households with cattle		% farmers											
			with grade cattle		feeding fodder		using napier grasss		feeding concentrate		conserving feed		using AI	
	Baseline	MTE	Baseline	MTE	Baseline	MTE	Baseline	MTE	Baseline	MTE	Baseline	MTE	Baseline	MTE
Kenya	**210**	**364**	**67.1**	**93.5[a]**	**100**	**87.6[b]**	**15.7**	**62.4[c]**	**19.5**	**49.6[d]**	**17.6**	**48.3[e]**	**10.5**	**25[f]**
Kabiyet	70	120	100	100	100	82.8[b]	18.6	52.3[c]	28.6	63.9[d]	15.7	43.4[e]	17.1	22.3
Metkei	71	123	52.1	88[a]	100	79.9[b]	9.9	50.8[c]	18.3	36.1[d]	25.5	47.5[e]	14.1	31.2[f]
Siongiroi	69	121	49.3	94[a]	100	100	18.8	83.5[c]	11.6	50.6[d]	11.6	55.6[e]	0.0	23[f]
Rwanda	**136**	**317**	**25.7**	**61.7[a]**	**95.3**	**93.9**	**30.9**	**27.0**	**15.4**	**10.8**	**12.5**	**15.8**	**9.6**	**29.6[f]**
Bwisanga	43	102	18.6	56.4[a]	99	99.9	34.9	22.1	11.6	17.1	7	22.2[e]	9.3	47.1[f]
Kibondo/Kabarore	40	114	17.5	59.5[a]	91.1	94.8	22.5	27.9	7.5	7.2	12.5	16.1	2.5	25.5[f]
Mbare	53	101	37.7	73.4[a]	94.7	85.1	34	33.5	24.5	10.3[d]	17	10.1	15.1	19.0
Uganda	**71**	**226**	**31**	**63.8[a]**	**100**	**98.9**	**16.9**	**75.6[c]**	**7.0**	**17.7[d]**	**8.5**	**11.9**	**9.9**	**16.9**
Mukono	43	106	37.2	57[a]	100	97.8	23.3	77.4[c]	9.3	34.7[d]	14.0	25.5	7.0	18.6
Luwero	28	120	21.4	69.3[a]	100	99.9	7.1	73.5[c]	3.6	3.3	0.0	0.8	14.3	14.0

Note: a, b, c, d, e and f indicate significant difference at 95% confidence interval in adoption of the technologies

The impact of the project on the EADD registered farmers was highest in Kenya (98.2%), then Uganda 85.1% and Rwanda (84.9%) as shown in Figure 3.

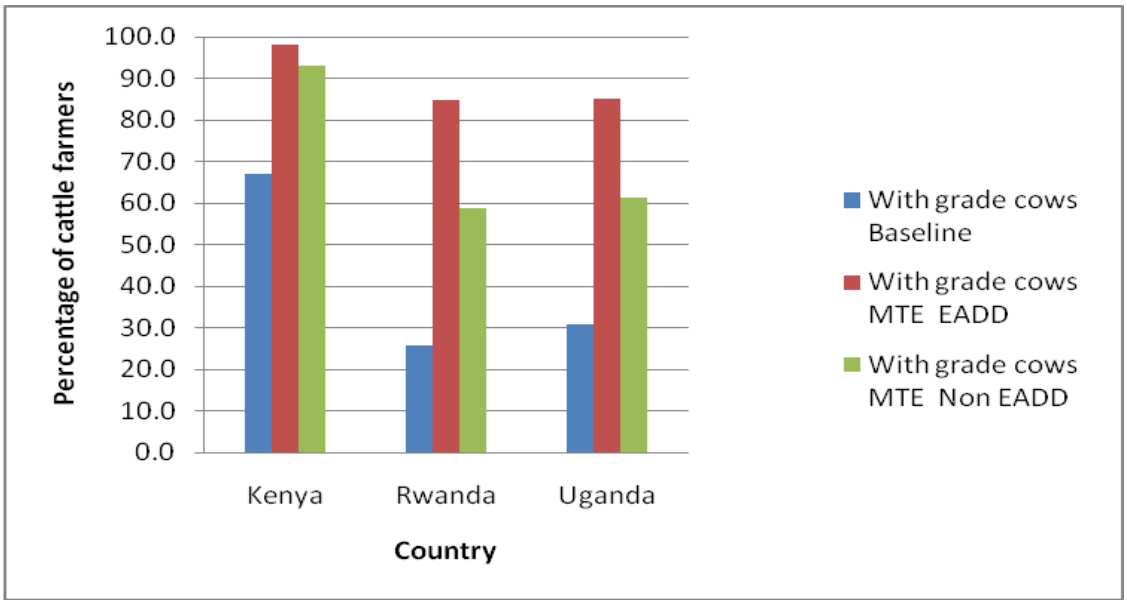

Figure 3: percentage of farmers keeping grade cows

For the non EADD registered farmers the project impact was estimated at 92.9%, 61.2% and 58.7% in Kenya, Uganda and Rwanda respectively. However, the differences may not be explained by project interventions given that i) the project started about 2 years before the MTE survey, an insufficient time for the first generation of improved breed cows to start milking and, ii) it is unlikely that all new grade cow adopters bought grade cows during that time (ILRI Reports to EADD - 1 – 2011). It seems therefore that the household selection was done differently in the two surveys (random for baseline and biased toward grade cow owners for MTE).

4.3.5.2 Fodder, Napier grass and concentrate feeding

The fodders used by the cattle keepers in the countries included Napier grass, crop by-products, hay, maize stover, weeds and cut grass (EADD baseline survey report No 3). Majority of the baseline farmers in the three countries used fodder to feed their cattle, however, the MTE data shows a slight reduction in the use of fodder (Table 5). A significant difference ($p < 0.000$) at 95% confidence interval in the use of fodder by the farmers was observed in Kenya while Uganda and Rwanda showed no difference ($p > 0.05$).

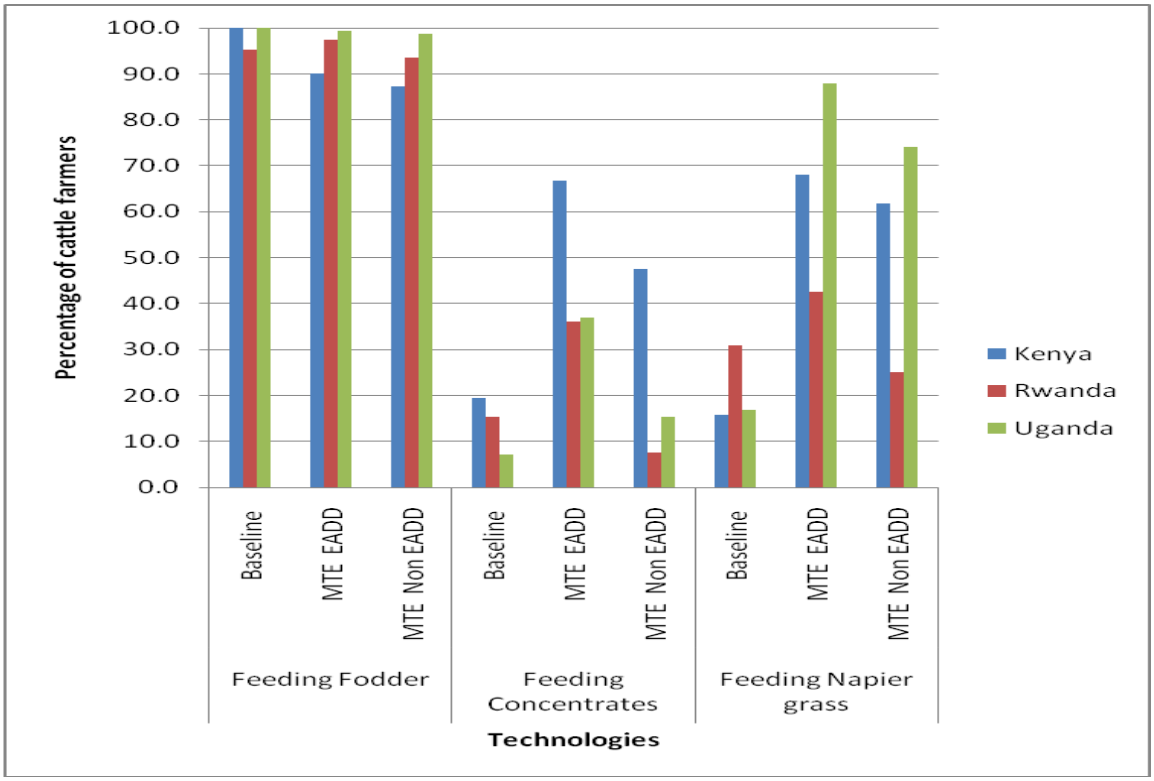

Figure 4: Percentages of farmers feeding fodder, concentrates and Napier grass during Baseline and MTE survey

Use of concentrate feeds was observed to have increased in Kenya and Uganda but dropped in Rwanda, particularly in Kabarore and Mbare (Table 5). The highest percentage of farmers using concentrates was reported in Kenya (49.6%), followed by Uganda (17.7%) and the lowest in Rwanda (10.8%) (Table 5). Although there is an increase in the use of concentrates, the farmers still face constraints in adopting the technology. Lack of knowledge on benefits and how to use the feeds are some of the constraints. The concentrate feeds are also costly and are not readily available.

Both Kenya and Uganda adopted the use of Napier grass fodder while Rwanda on the other hand showed a reduction in the use of the fodder. Looking at the uptake of feed technologies among the EADD registered farmers the highest impact was observed in Uganda for those using Napier grass, while the highest impact use of concentrate was in Kenya (Figure 4).

4.3.5.3 Feed conservation

A significantly ($p<0.000$) high proportion of farmers in Kenya (48.3%) practiced feed conservation compared to Rwanda (15.8%) and Uganda (11.9%) (Table 5). Rwanda ($p>0.365$) and Uganda ($p>0.595$) showed no significant differences in uptake of feed conservation practices. Siongiroi, Bwisanga and Mukono had higher proportions of farmers taking up feed conservation practices in Kenya, Rwanda and Uganda respectively. There was no significant change observed in Luwero in the adoption of feed conservation practices. The feed conservation technologies were mostly taken up by farmers registered with EADD in the different countries as shown in Figure 5.

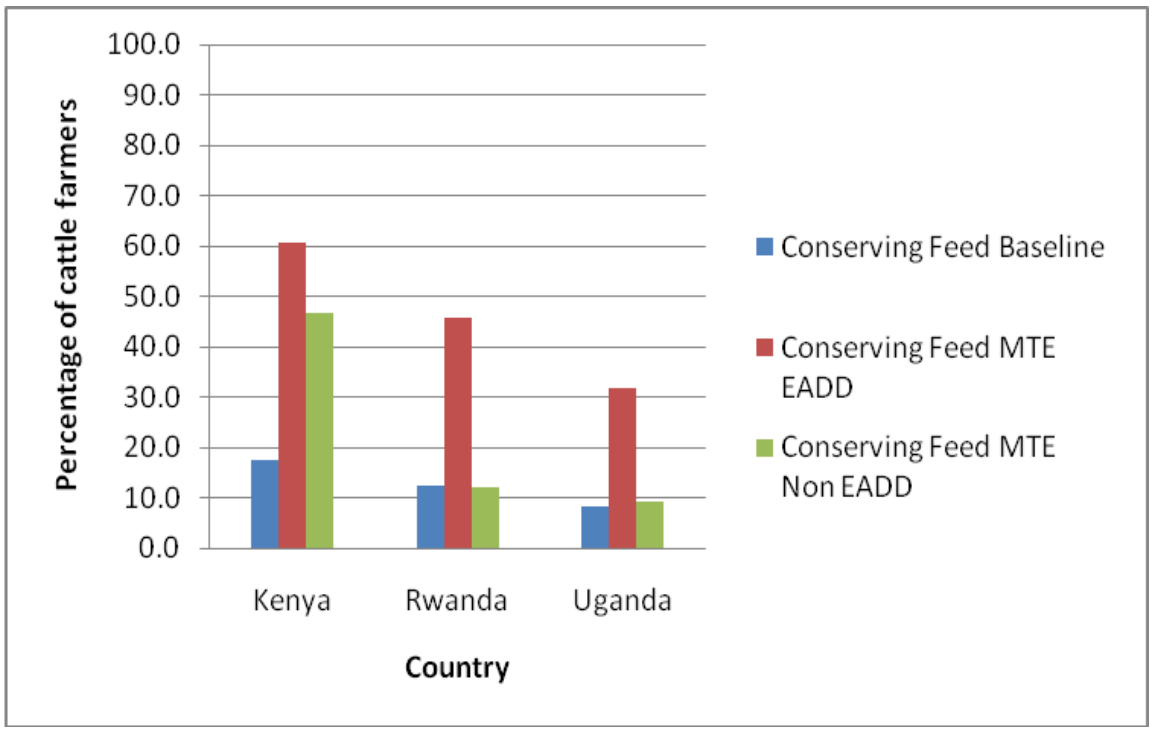

Figure 5: Percentage of farmers conserving feed

The major constraints in the uptake of the feed conservation technology in all the three countries were lack of technology information, interest and feed and feed to conserve. Another important constraint was farmers found it expensive to be expensive.

4.3.5.4 Use of artificial insemination services

The results show that less than 20% of the dairy farmers in the baseline survey used artificial insemination (AI). The mid- term review on overall reported Rwanda (29.6%) having the highest percentage of cattle keeping households using AI. Kenya had 25% and Uganda reported the lowest with 16.9 % of the dairy farmers using AI services (Table 5). Among the cattle keepers, higher percentages of farmers taking up AI services were in Bwisanga (47.1%) in Rwanda, Metkei (31.2%) in Kenya and Mukono (18.6%) in Uganda. For the three countries on overall, project impact was estimated to be over 50% with highest recorded in Rwanda with 65.8% of the farmers taking up A.I, 58.2% Uganda

and Kenya (55.6%) had the lowest proportions among those registered in EADD. The impact on the non EADD farmers was 25.0% in Rwanda, 21.3% Kenya and Uganda 11.8% as shown in Figure 6.

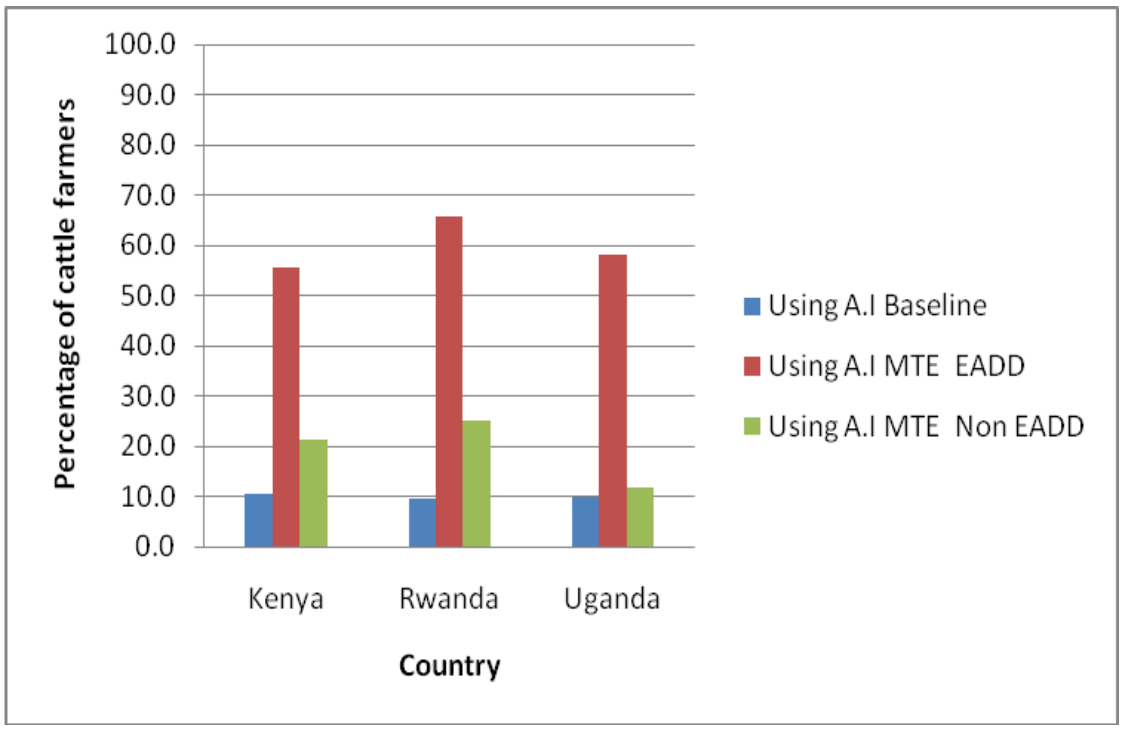

Figure 6: Percentage of farmers using artificial insemination

The main constraints to adoption of artificial insemination include low availability of the service; high cost; low capacity of farmers and technicians to effectively use the technology; inappropriateness of the technology in meeting farmers' needs; lack of cash to pay for AI services; and lack of support services such as veterinary and extension services (East Africa Dairy Development Project Baseline Survey Brief No. 2 (2011)).

The EADD project is having significant impacts on the country sites surveyed as seen in the results from the analysis. Major impacts were observed among the EADD registered cattle keepers as the farmers seemed to take up the new technologies introduced by the

project compared to the non-registered EADD cattle keepers. Comparing the baseline and MTE, both the MTE registered and non-registered farmers had higher proportion of farmers are taking up the technologies than in the baseline. Among all the three countries, Kenya on overall had the highest uptake of the technologies. Rwanda on the other hand showed no significant changes in the adoption of Napier grass fodder and use of concentrate feed.

4.4 Project field work

The survey tool, the questionnaire was designed (see Appendix 14) and pre-tested in Githunguri. The three farmers sampled in the pre-testing were identified by the Ministry of Livestock district officer in Githunguri. After the pre-testing the questionnaire was reviewed and modifications were made from the lessons learnt from the pre-testing exercise.

The training of the field staff was successfully conducted in Uganda on the 13th of July 2011 and the pre-testing on the 14th July 2011 with some selected farmers in Kasangati Dairy Cooperative society. Each interviewer was allocated one farmer to interview at the cooperative. Therefore a total of six farmers were sampled in the pre-testing exercise in Kasangati. Feedback from each individual interview was collected, further discussions and reviews where conducted on the different experiences from the pre-test.

Plate 2: Training of field staff at EADD head office in Uganda

The training was crucial for the field staff since the interviewer control the quality of the results obtained from the interview. According to Valenzuela and Shrivastava (2011), it is important to organize in detail and rehearse the interviewing process before beginning the formal study. The pretesting was a rehearsal for the interviewers in which they recieved training like that of the main survey and administered the questionnaire as they would during the main survey. Pre- testing evaluates in advance whether a questionnaire causes problems for the interviewers or respondents (Presser et al., 2004). Similarly Moser and Kahn (1971) judged that almost the most useful evidence of all on the adequacy of a questionnaire is the individual interviewers report on how the interviews went.

Plate 3: Pre-testing of the questionnaire with a farmer in Kasangati, Uganda

4.5 Communication and Teamwork

Planning was very important at all stages of the tasks undertaken during the attachment. This was mainly done through team meetings and liaisons. The planning meetings involved identifying priority needs and opportunities, discussing possible courses of action, choosing the most appropriate ones and agreeing on what is expected to be achieved. The sharing of information and communicating openly among team members ensured that issues were dealt with and more informed decisions were made. The planning increased the efficiency, effectiveness and success of the outputs produced. Working in teams made undertaking the tasks easier and good communication ensured all tasks were done on time and good quality work was handed in at the end of the day. The

interactions with team members resulted in good positive relations and conducive working environment.

CHAPTER FIVE

5.0 CONCLUSIONS

The trainings were successfully conducted and further statistical consultancy on the use of the GenStat followed during the preparation for the GEF-Asia draft reports. The main challenge was the time allocated was short to train the students all the basic information on the use of the statistical software. The two projects data was organised and managed in before any analysis was performed on the data using GenStat for the Gef-Asia project and Stata for the EADD data. The data was stored in the respective statistical software format for future use and referencing as is the procedure at the host institution. Reports were prepared after analyzing the data for EADD project as part of ILRI reporting to its partners.

Throughout the attachment good communication skills with the team members was required, this enabled the outcomes of the research outputs and attainment of the attachment objectives. Several other lessons were learnt especially in data analysis, on how to handle biased data, missing data and making comparisons of datasets collected using different sampling designs.

Finally research support was provided to the scientists at the host institution in the different aspects of the research work which included participating in data organisation, management, analysis, interpreting and reporting of the results in the EADD and GEF-Asia projects. The report has presented the methodologies and outputs of the tasks carried out during the attachment. The objectives of the research attachment were successfully achieved.

CHAPTER SIX

6.0 RECOMMENDATION

In both the two projects , the EADD and GEF-Asia the sampling of the households surveyed had biased sampling which made analysis and reporting of the results not representative of the population. More care and consistency in the sampling methods should be done in future studies to avoid bias in population. This will also make comparisons during evaluations of the projects straight forward.

The Master of Science in Research Methodology is a new course and the nature of the research attachment is also new. There is need to create more awareness the research organisation and institutions for them to appreciate the expertise of the research methods professional. Creating awareness will also enable the students to fit into the organizations very well and the host institutions or organizations will be able to understand the purpose of the attachment.

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APPENDICES

Appendix 1 : Training Plan

Using GenStat for Data Analysis

By Moono Mayoba Barbara

Objectives

1. To enable the students to know the basic use of the GenStat menus.
2. To enable students to describe any data set that is well-organized and of acceptable quality in ways that correspond to the stated objectives of the study.
3. To enable the students make statistically valid generalizations of the findings
4. To provide support to data analysis.

Outline of the training sessions

Time	**Activities**
8:30 am - 10:30 am	**Session 1: Introduction to GenStat** **Topics** ▪ Introduction to GenStat ▪ demonstration of how to use the menus ▪ Importing data into GenStat
10:30 am – 11:00 am	Break

11:00 am - 12:30 pm	**Session 2: Descriptive statistics in GenStat** **Topics** ▪ Graphics in GenStat- Boxplots, scatter plots etc. ▪ Numerical summaries in GenStat- mean, range, variance etc ▪ Demonstrations and practicals
12:30 pm - 2:00 pm	Lunch Break
2:00 pm - 4:00 pm	**Session 3: Statistical modeling** **Topics** ▪ Linear regressions, ANOVA etc ▪ Interpretation of the output ▪ Demonstrations and practicals

Appendix 2: GenStat training evaluation form

SHORT TRAINING COURSE ON GENSTAT STATISTICAL PACKAGE

Date: ……..

TRAINER: MOONO MAYOBA BARBARA (MSC RM STUDENT)

Course Evaluation Questionnaire

(Please take a few minutes to complete)

Course Impact

1. How *useful* did you find the course?

Very useful Useful Quite usefulŽ Ž Not useful

2. How *demanding* did you find the course?

Very easy Easy Not easy Ž Very difficult

Did we get it *right*?

	Too little	Little	Much	Too much
1. Amount of material covered	☐	☐	☐	☐
2. Practical content	☐	☐	☐	☐
3. Statistical theory	☐	☐	☐	☐
4. Statistical knowledge assumed	☐	☐	☐	☐
5. Computing knowledge assumed	☐	☐	☐	☐

General

1. How did you rate the overall *standard* of teaching?

Very good Good Poor Very poor

2. How did you rate the *quality* of the course notes?

Very good Good Poor Very poor

3. Would you *recommend* the course to other people?

Yes Perhaps No

If no, please give your reason(s).

Individual Sessions

Please indicate your level of understanding:

	Thorough understanding	Little understanding	No understanding
a. Introduction to GenStat	☐	☐	☐
b. Descriptive Statistics in GenStat	☐	☐	☐
c. Statistical Modelling	☐	☐	☐

Further comments on any of the above or any other aspects of the course (e.g. teaching style, practical work, etc.)

You may give your name or return the questionnaire in confidence.

……

……

Thank you for completing this questionnaire.

Appendix 3: Attachment work plan

TASK/ACTIVITY	DETAILS	TIMELIME
GENSTAT TRAINING (1 day training of GenStat to GEF- Asia researchers - Sri Lanka, Bangladesh and Vietnam) - First training two researchers (Sri Lanka and Bangladesh) on November 12th, 2010. - Second training one researcher from Vietnam on January 12th, 2011.	**Objectives** • To enable the students to know the basic use of the GenStat menus. • To enable students to describe any data set that is well-organized and of acceptable quality in ways that correspond to the stated objectives of the study. • To enable the students make statistically valid generalizations of the findings • To provide support to data analysis.	**November 2010 to January 2011**
Continuous support to GEF Asia researchers - With the GEF-Asia researchers and supervisors	- Help out with data analysis problems for the baseline survey. - Come up with baseline draft report in the expected deadlines (dependent on the time of visit**).**	**November 2010 to January 2011**
DATA ANALYSIS Lessons Learnt from Mid-Term Evaluation (MTE) EADD MTE_data analysis (Working with Isabelle, Alice and Emmanuel)	**Objectives** • MTE data: understand what kind of farmers registered with EADD; and what kinds participate actively? • MTE data: identify amongst EADD active participants poor households and what makes them different from the other poor who don't participate?	**November 2010 to September 2011**

DATA ANALYSIS **Proxy Variables to identify the poor** EADD- Baseline data (work with Emmanuel)	**Objective** • Identifying proxy to be used in the field to identify poor farmers. • validate the results using principal component analysis	**February 2011**
STATISTICAL SOFTWARE TRAINING FOR EADD M&E PEOPLE	**Objective** To empower the staff with basic knowledge in using SPSS and GenStat **Focus:** - A snapshot of the various quantitative soft wares (GenStat and SPSS) - Rest of the time on qualitative analysis	**10th March**
DATA ANALYSIS (Isabelle) Baseline survey Milk Production and Gross margin per household for each site in Uganda for the Impact assessment proposal- TM hubs in Uganda	**Data analysis objectives :** • To determine the baseline annual gross margin and milk production per household for each site in Uganda • To calculate the intra-site correlation on milk production and the gross margins.	**4th April to 12th April (Meet deadline)**

EADD- FIELD WORK **Cost of milk production and feed cost benefit analysis** **(Work with Isabelle and Emmanuel)** - Field work will be carried out in Uganda and Kenya)	**Objective** **To assess cost of milk production in selected EADD project sites** To identify barriers to participation (understand motivation of potential participants (why side selling and low use of services). Tasks that will be carried out will include: • Assisting in design of survey instruments and sampling • Training of field staff • Overseeing start of survey • Data collection and management • Data analysis and report writing	**Week of May 23rd (Uganda)** **Week of June 20th (Kenya)**

Appendix 4: Results for logistic regression marginal effects for Kenya

Variable	dy/dx	p>|z|
Employment of labour	-.2228697	0.000
Head schooling years ≤9rs (1,0)	.126404	0.005
Total acres of land owned ≤6acres (1,0)	.0852524	0.062
Ownership of mobile phone	-.2840323	0.000
Ownership of spray pump	-.1089908	0.013

Appendix 5: Results for rotated component matrix (Kenya)

	Component			
Variable	**1**	**2**	**3**	**4**
Ownership of mobile	.861			
Ownership of spray pump	.650	.495		
Employment of labour		.932		
Head schooling years ≤9rs (1,0)			.949	
Land ownership ≤6acres (1,0)				.989

Appendix 6: Results for logistic regression marginal effects for Rwanda

Variable	dy/dx	p>|z|
Employment of labour	-.0567511	0.069
Head schooling years ≤ 7yrs (1,0)	.2416339	0.000
Ownership of mobile phone	-.0875039	0.031
Ownership of spray pump	-.0574868	0.146
Land owned ≤5 acres (1,0)	.2887744	0.000

Appendix 7: Results for rotated component matrix (Rwanda)

	Component			
Variable	**1**	**2**	**3**	**4**
Ownership of spray pump	.917			
Land owned ≤5 acres (1,0)	.726	.430		
Ownership of mobile phone		.920		
Head schooling years ≤7yrs (1,0)			.983	
Employment of labour				.942

Appendix 8: Results for logistic regression marginal effects for Uganda

Variable	dy/dx	p>|z|
Employment of labour	-.0759541	0.049
Head schooling years ≤7yrs (1,0)	.1651476	0.000
Ownership of mobile phone	-.100691	0.002
Ownership of shovel	-.0669998	0.051
Land owned ≤6 acres (1,0)	.0737516	0.057

Appendix 9: Results for rotated component matrix (Uganda)

	Component			
Variable	**1**	**2**	**3**	**4**
Ownership of mobile	.818			
Employment of labour	.778			
Land owned ≤6 acres (1,0)		.960		
Head schooling years ≤7yrs (1,0)			.979	
Ownership of shovel				.983

Appendix 10: Technology adoption non-weighted matched sites for MTE and Baseline

Country	Site	Numbers of Households with cattle		% farmers with grade cows		% farmers feeding concentrate		% farmers feeding fodder		% farmers using AI		% farmers using napier		% farmers conserving feed	
		Baseline	MTE	Baseline	MTE	Baseline	MTE	Baseline	MTE	Baseline	MTE	Baseline	MTE	Baseline	MTE
Kenya	Kabiyet	70	120	100.0	100.0	28.6	75.8	100.0	86.7	17.1	39.2	18.6	60.8	15.7	86.7
	Metkei	71	123	52.1	92.7	18.3	43.1	100.0	80.5	14.1	44.7	9.9	50.4	25.5	80.5
	Siongiroi	69	121	49.3	95.9	11.6	59.5	100	100.0	0.0	43.0	18.8	86.0	11.6	100.0
	Total	**210**	**364**	**67.1**	**96.2**	**19.5**	**59.3**	**100**	**91.4**	**10.5**	**42.3**	**15.7**	**65.7**	**17.6**	**91.4**
Rwanda	Bwisanga	43	102	18.6	74.5	11.6	35.3	99	99.0	9.3	74.5	34.9	26.5	7.0	99.0
	Kibondo/K	40	114	17.5	71.9	7.5	17.5	91.1	94.7	2.5	42.1	22.5	38.6	12.5	94.7
	Mbare	53	101	37.7	86.1	24.5	31.7	94.7	95.0	15.1	46.5	34.0	47.5	17.0	95.0
	Total	**136**	**317**	**25.7**	**77.3**	**15.4**	**27.8**	**95.3**	**95.3**	**9.6**	**53.9**	**30.9**	**37.5**	**12.5**	**95.3**
Uganda	Luwero	43	106	21.4	80.0	3.6	14.2	100	99.2	14.3	44.2	7.1	84.2	0.0	99.2
	Mukono	28	120	37.2	71.7	9.3	45.3	100	99.1	7.0	36.8	23.3	81.1	14.0	99.1
	Total	**28**	**226**	**31.0**	**76.1**	**7.0**	**28.8**	**100**	**99.1**	**9.9**	**40.7**	**16.9**	**82.7**	**8.5**	**99.1**

Appendix 11: Technology adoption weighted matched sites for MTE and Baseline

Country	Site	Numbers of Households with cattle		% farmers with grade cows		% farmers feeding concentrate		% farmers feeding fodder		% farmers using AI		% farmers using napier		% farmers conserving feed	
		Baseline	MTE	Baseline	MTE	Baseline	MTE	Baseline	MTE	Baseline	MTE	Baseline	MTE	Baseline	MTE
Kenya	Kabiyet	70	120	100.0	100.0	28.6	63.9	100.0	82.8	17.1	22.3	18.6	52.3	15.7	43.4
	Metkei	71	123	52.1	88.0	18.3	36.1	100.0	79.9	14.1	31.2	9.9	50.8	25.5	47.5
	Siongiroi	69	121	49.3	94.0	11.6	50.6	100	100.0	0.0	23.0	18.8	83.5	11.6	55.6
	Total	**210**	**364**	**67.1**	**93.5**	**19.5**	**49.6**	**100**	**87.6**	**10.5**	**25.0**	**15.7**	**62.4**	**17.6**	**48.3**
Rwanda	Bwisanga	43	102	18.6	56.4	11.6	17.1	99	99.9	9.3	47.1	34.9	22.1	7.0	22.2
	Kibondo/Kabaro	40	114	17.5	59.5	7.5	7.2	91.1	94.8	2.5	25.5	22.5	27.9	12.5	16.1
	Mbare	53	101	37.7	73.4	24.5	10.3	94.7	85.1	15.1	19.0	34.0	33.5	17.0	10.1
	Total	**136**	**317**	**25.7**	**61.7**	**15.4**	**10.8**	**95.3**	**93.9**	**9.6**	**29.6**	**30.9**	**27.0**	**12.5**	**15.8**
Uganda	mukono	43	106	37.2	57.0	9.3	34.7	100	97.8	7.0	18.6	23.3	77.4	14.0	25.5
	luwero	28	120	21.4	69.3	3.6	3.3	100	99.9	14.3	14.0	7.1	73.5	0.0	0.8
	Total	**28**	**226**	**31.0**	**63.8**	**7.0**	**17.7**	**100**	**98.9**	**9.9**	**16.9**	**16.9**	**75.6**	**8.5**	**11.9**

Appendix 12: Technology adoption for MTE non- weighted Comparisons by group

Country	Site	EADD with cattle			farmers with grade cows		farmers feeding concentrates		feeding fodder		Using A.I		Using Napier grass		Conserving feed	
		Total of farmers	No. Eadd farmers	No. Non Eadd farmers	% EADD	% Non EADD	% EADD	% Non EADD	% EADD	% Non EADD	% EADD	% Non EADD	% EADD	% Non EADD	% EADD	% Non EADD
	Kabiyet	120	75	45	100.0	100.0	84.0	62.2	89.3	82.2	50.7	20.0	66.7	51.1	57.3	42.2
	Metkei	123	74	49	97.3	85.7	50.0	32.7	81.1	79.6	58.1	24.5	50.0	51.0	66.2	42.9
	Siongiroi	121	74	47	97.3	93.6	66.2	48.9	100.0	100.0	58.1	19.1	87.8	83.0	58.1	55.3
Kenya	**TOTAL**	**364**	**223**	**141**	**98.2**	**92.9**	**66.8**	**47.5**	**90.1**	**87.2**	**55.6**	**21.3**	**68.2**	**61.7**	**60.5**	**46.8**
	Bwisanga/	102	74	28	82.4	53.6	43.2	14.3	98.6	100.0	86.5	42.9	28.4	21.4	62.2	17.9
	Kibondo/I	114	75	39	81.3	53.8	25.3	2.6	94.7	94.9	54.7	17.9	46.7	23.1	38.7	10.3
	Mbare	101	76	25	90.8	72.0	39.5	8.0	98.7	84.0	56.6	16.0	52.6	32.0	36.8	8.0
Rwanda	**TOTAL**	**317**	**225**	**92**	**84.9**	**58.7**	**36.0**	**7.6**	**97.3**	**93.5**	**65.8**	**25.0**	**42.7**	**25.0**	**45.8**	**12.0**
	Mukono	106	68	38	82.4	52.6	52.9	31.6	100.0	97.4	50.0	13.2	83.8	76.3	51.5	21.1
	Luwero	120	73	47	87.7	68.1	21.9	2.1	98.6	100.0	65.8	10.6	91.8	72.3	13.7	0.0
Uganda	**TOTAL**	**226**	**141**	**85**	**85.1**	**61.2**	**36.9**	**15.3**	**99.3**	**98.8**	**58.2**	**11.8**	**87.9**	**74.1**	**31.9**	**9.4**

Appendix 13: Work plan for Cost of milk production training in Uganda

Date	Activity	Time
Tuesday 12th July, 2011	Training of Enumerators	8: 30 AM – 1:00 PM 2:00 PM – 5:00 PM
Wednesday 13th July, 2011	Pretest of the questionnaire (*Two questionnaire per enumerator)*	8:30 AM – 1:00 PM 2:00 PM -5:00 PM
Thursday 14th July, 2011	Revision of the questionnaire with the enumerators	8:30 AM – 1:00 PM 2:00 PM- 5:00 PM

Appendix 14: Cost of milk production questionnaire

COST OF MILK PRODUCTION QUESTIONNAIRE

1. General Information

Country	
Hub	
Respondent Name	
Gender	
Age	
Code	
Enumerator name	
Date of interview	

2. What is the main system for keeping cattle (tick)?

Mainly grazing(Free range or tethered) [___] Mainly grazing with some stall feeding [___]

Mainly stall feeding with some grazing [___] Mainly stall feeding [___]

3. **Indicate the details for cattle kept on the farm**;

Animal type	**Breed** (codes)	**Number kept**	**Did you purchase any in the last 3 months? If yes,**	
			Number purchased	**price per animal**

Bulls (>3 yrs)				
Castrated adult males (>3 yrs)				
Immature males (< 3 yrs)				
Cows (calved at least once) DRY				
Cows (calved at least once) LACTATING				
Heifers				
Male calves				
Female calves				

	Breed codes			**13=** Ngada
1 =Hostein-Friesian (pure)	**4** = Ayrshire (cross)	**7=** Guernsey (pure)	**10=**Boran	**14=**Nsoga
2 =Hostein-Friesian (cross)	**5** = Jersey (pure)	**8=**Guernsey (cross)	**11=**Local Zebu	**15=**Red poll
3 =Ayrshire (pure)	**6**= Jersey (cross)	**9=**Sahiwal	**12=**Ankole	**16=** Other (specify)

4. **Milk production and utilization details:** Indicate details of milk production for every LACTATING cow. If more than six cows please choose two from each breed

		COW1	COW2	COW3	COW4	Cow5	Cow6
Cow name/ ID							
Breed (codes above)							
Age (Years)							
Number of calving							
Age at first calving							
Last service date (MM/YY)							
Calving interval (in months)							
Last calving date (MM/YY)							
Lactation length (in months)							
TOTAL DAILY MILK PRODUCTION (Morning plus evening milk) in litres	At Calving (initial milk production)						
	Yesterday						

5. **Milk utilization details(morning milk and evening milk)**

Indicate details on fresh milk utilization on an average day

Fresh milk usage		Quantity per DAY (Litres)	Price/ Unit	Total value	Mode of payment	Who transported	Cost of transport*
Milk sold to different buyers	**Milk sold to CP**						
	Individuals						
	Private traders						
	Others						
Milk consumed							
Milk given out							
Milk given to calves							
Milk loss due to spoilage							
Mode of payment 1 =cash daily 2=cash at month end		**Who transported** 1= Farmer 2 = Hired transport, organised by farmer					

3= bank 4= SACCO (***linked to Hub)*** 5= other, specify	3 = Hired transport, organised by CP or DFBA 5= other, (specify)_____		

6. Have you sold **manure for the last three months?** [___]=YES [___]=NO

If yes, what is the value of the sale? [_____] (local currency)

7. Have you sold any **cattle** in the last three months? [___]=YES [___] =NO (tick)

If **Yes**, indicate, for the **details** on all **cattle sold**.

Animal type	Number sold	Total value (local currency)

8. Has any **cattle died** in the last **3 months**? [___]=YES [___]=NO (tick)

If **Yes**, indicate **details** on all **cattle that died**.

Animal type	Breed	Number

	Breed codes			
1 =Hostein-Friesian (pure)	**4** = Ayrshire (cross)	**7=** Guernsey (pure)	**10=**Boran	**14=** Ngada
2 =Hostein-Friesian (cross)	**5** = Jersey (pure)	**8=**Guernsey (cross)	**11=**Local Zebu	**15=** Nsoga
3 =Ayrshire (pure)	**6**= Jersey (cross)	**9=**Sahiwal	**12=**Ankole	**16=** Red poll
Animal type				**16=** Other (specify
1=Adult male	2= Cow	3= Heifer	4= Male calf	5= female calf

9. Have you employ labour for cattle activities in the last three months? [___] = YES [___] = NO

If Yes, how many labourers [___] and what is the monthly cost per labourer per month? [_____]

10. Household labour for livestock production

Give details on household members who participate in cattle activities in the last three months

Name	**Male =1 Female=2**	**Average hours spent on cattle activity per day**

11. Have you practiced grazing in the last **three months**? Yes [___] No [___]

If yes what is the approximate size of the grazing land? [___] Acres or [_____] Hectares

Do you pay for the grazing land Yes [___] No [___] If yes how much per month [____]

How many people were required to graze cattle? [_____] and what is their monthly cost (per person)? [_____]

12. Have you paid for livestock water in the last **three months**? Yes [___] No [___]

If Yes how much do you pay per month [_____] and what is the cost of labour used to water livestock per month [_____]

13. Give details on Fodder/forage **production** and **purchase**

	Indicate quantity and **cost** value for feed produced and purchased for the last **three months**											
	Produced Feed			**Purchased Feed**								
	Acres planted	**Quantity**	Unit	**Quantity**	Unit	Price per unit	Transport cost	Labour cost	Other cost	Total cost	Where purchased	Payment mode
Napier grass												
Cut grass												
Green stovers												
Dry cereal crop residue												
Other (specify)												

Units		**Where Purchased**	**Payment mode**	
1 = Head loads	**6** = Truck load	**1=**Individual farmer	**1=**cash	
3 = Donkey cart load	**7** = Other(specify)_____	2=cooperative	2=Bank	
4 = Hand cart or wheelbarrow load		3=shop/agrovet	3=check-off	
5 = Pick-up load		4= feed company	4=SACCO (***Linked to Hub***)	
		5=others(specify)_____	5= Other(specify)____	

14. Give details on **Commercial feed Feeding and cost**

	Indicate quantity and value of each feed for the last **three months**								
	Quantity	Unit	Price per unit	Transport cost	Labour cost	Other costs	Total cost	Where purchased	Mode of payment
1 = Dairy meal									
2 = Maize bran									
3 = Wheat bran									

4 = Maize germ									
5=Other (specify)__									

Units

1 = Kgs

2 = Standard sacks (specify Kgs)_____

3 = Other (specify)_____

15. Have you conserve feed in the last three months? Yes [___] No [___]

If yes which type of conservation (codes) [____][____][____][____]

Conservation Codes		
1 = Tube Silage	5 = Machine baling	10= Other (specify)_____
2 = Above the ground	6 = Standing hay	
3 = Pit silage	8 = Stacking under shade	
4 = Box baling	9 = Stacking in the store_____	

Provide details on **cost of conserving the major feed**

	Hay [1= baled 2=standing 3=other (specify) _____]		**Silage[1=tube 2=pit 3=other (specify)_____]**	
Type (codes)				
Feed, specify (e.g. Lucerne, Rhodes, napier, maize)				
Unit				
Quantity				
Cost of gathering feed				
Total cost of harvesting/baling				
Total cost of handling (**labour**)				
Total cost of transport				
Total cost of processing				
Any other cost (specify)_____				
Cost of materials and equipments for packaging/storage				
Storage material: 1_____				
2_____				
3_____				
Total Cost of transporting packaging materials				
Total Cost of additives e.g. molasses: 1_____				
2_____				
3_____				
Total cost of handling (**labour**)				
Cost of maintaining the store				
Any other cost (specify)_____				
Utilization				

Quantities of the final products (**use same unit as above**)				
Quantity **fed** to cattle				
Quantity **sold**				
Value of feed **sold**				

Unit codes		**Storage materials codes**
1= Kgs	8= Other (specify)	
2= Tons		1 = bags
3= Standard sack		2 =silage paper
4= wheelbarrow load or hand cart		3=containers
5= Pick-up load		4 = Tanks
6= Donkey cart load		5 = Other (specify)
7= Bales		

16. Provide details on the following machines and equipments that household owns

Equipment	**Number owned**	**Year purchased**	**Purchase price**	**% utilization in dairy activities for those used in other enterprises**
Milking machine				
Milking buckets				
Milk churn				
Chaff cutter				
Bush knife				
Wheel barrow				
Bicycle				
Knapsack sprayer				
Others(Specify)__				

17. Provide details on animal health and breeding services that you have used in the last three months

Type of service/ treatment	Have you used for the last 3 months? **1**=Yes, **0**=No	**If yes,**		
		Who provided the service	**Total cost** (local currency)	**Mode** of payment
Anthelmintics (deworming)				
Vaccination				
Tick control				
Curative treatments				
Milking salve				
Teat disinfectant				
AI services				
Bull services				
Other, specify _____				

Service provider	**Mode of payment**
1 = Government **2** = Private practitioner, independent 3= Private practitioner, EADD supported **3** = Cooperative/ DFBA, EADD supported **4** =Farmer **5** = NGO, specify name **6** = Others (specify)_____	1=cash 2=check off 3=SACCO (***Linked to Hub***) 4= other(specify)

18. Indicate the cost of livestock extension services including **training** events and **exchange** visits

Livestock extension service providers	**Number of visits in last 3 months**	**Cost in the last three months**	**Mode of payment (*codes in 17*)**
Government			
EADD			
Private Practitioners			

Cooperative/ farmer group			
Others, specify:_____			

19. Do you keep written records for your cattle enterprises Yes [ ] No [ ]

If **yes** which ones? **[__] [__] [__] [__]**

1= Breeding records	5= Death and births
2=Production records	6= feeding records
3=Veterinary (treatment) records	7= Others(specify)_____
4=Sales and purchases	

20. Has anyone in the households obtained loan for dairy activities in the last 3 months? Yes [ ] No [ ]

If **yes** give these details

Credit need	**Source**	**Form of credit 1= Money 2= materials**

Credit needs	**Credit Source**	
1=Purchase animals	**1=** Government agency/bank	5=NGO 6=Self Help Group
2=Purchase feeds	2= commercial banks	7=SACCO (***Linked to Hub***)
3=Veterinary service	3= Informal lenders	8= Others (specify)
4=AI services	**4=**Cooperatives	

21. Do you keep cattle in a housing premise? [___] = YES [___] = NO

Provide details on **cost** of these building materials used in construction **including expansion**

Materials	**Cost of dairy shed zero-graze unit (Local currency)**	**Cost of boma or paddock (Local currency)**
Wood		

Cement/Stone/Sand		
Thatch		
Iron sheets		
Nails		
Fences		
Labour		
Transport		
Others		
When was it built (**year**)		
Approximate value		
Annual maintenance cost		