

**EVALUATION OF ANIMAL HEALTH CARE DELIVERY
SYSTEMS IN WEST POKOT AND TURKANA DISTRICTS OF
KENYA**

**A thesis submitted in fulfillment of the requirements for the Degree of
Doctor of Philosophy of the University of Nairobi**

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2010

DECLARATION

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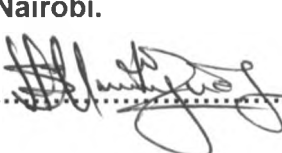
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DEDICATION

To My parents

To my father and mother, Pastor John Lewa Ndolo and and Mrs Sarah Lewa, I wish to thank you so much for having brought me up in a God fearing manner. I appreciate your dedication and selflessness while facilitating my access to quality education. I am grateful to your timely recognition of the fact that a girl child is an equal child because it is due to this fact that you availed education to me without limitations. May the lord bless you for always remembering me in your daily prayers.

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LIST OF ABBREVIATIONS

ACTED	Agency for Technical Cooperation and Development
ACTS	African Center for Technical Studies
AE	Adult Equivalents
AHA	Animal Health auxiliaries
AHC	Animal Health Care
AHSDs	Animal Health Service Deliverers
ASALs	Arid and Semi-arid Lands
AU/IBAR	African Union/Interafrican Bureau for Animal Resources
CAAD P	Comprehensive Africa Agriculture Organization Programme
CAHWs	Community Animal Health Workers
CAHPs	Community-Based animal Health Programs
CBPP	Contagious Bovine PleuroPneumonia
CBT	Cross-Border Trade
CCPP	Contagious Caprine PleuroPneumonia
CIDA	Canadian International Development Agency
CFTs	Community Trade Farmers
CLW	Community Livestock Workers
COMESA	Common market for Eastern and Southern Africa
DVO	District Veterinary Officer
ECF	East Coast Fever
EU	European Union
FAO	Food and Agricultural Organization of the United Nations
FGD	Focus Group Discussion
FMD	Foot and Mouth Disease
GDN	Global Development Network.
GDP	Gross Domestic Product
GTZ	Deutsche Gesellschaft for Technisc Zusammenarbeit
IBD	Infectious Gumboro Disease
IDRC	International Development Research Center
IFAD	International Fund for Agriculture Organization
IFS	International Foundation for Science
ILRI	International Livestock Research Institute
IPAR	Institute of Policy Analysis and Research
ITDG	Intermediate Technical development Group
KVAPS	Kenya Veterinary Association Privatization Scheme
LPM	Linear Probability Model
ME	Middle East
NCD	Newcastle Disease
NALEP	National Livestock Extension Program
NEP	National Extension Program
NEPAD	New Partnership for Africa's Development
NEPDP	North Eastern Province Pastoral Development Project
NGOs	Non Governmental Organizations
OLS	Operation Lifeline Sudan
OIE	'Office Internationale des Epizooties
PARC-VAC	Participatory Community-based Animal health and Vaccination
PFS	Pastoral Field Schools

PINEP	Pastoral Information Network Programs
PPR	Peste Petits Des ruminants
PSUs	Primary sampling Units
PVS	Performance of veterinary Services
RDFs	Revolving Drug Funds
RRA	Rapid Rural Appraisals
RVF	Rift Valley Fever
SAPS	Structural Adjustment programs
SIDA	Swedish International Development Authority
SF	Swine Fever
SPS	Sanitary and Phytosanitary Standards
SPSS	Statistical Package for Social sciences
SSA	Sub-Saharan Africa
TBDS	Trans-Boundary Diseases
TLU	Tropical Livestock Units
UAE	United Arab Emirates
UK	United Kingdom
UNU-IAS	United Nations University-Institute for advanced studies
VVs	Village Vets
WB	World Bank
WHO	World Health Organization/Codex Alimentarius WHO
WLS	Weighted Least Squares

ABSTRACT

In the 1970's, Kenya had appreciable access to international markets for livestock and livestock products in the Middle East and European countries. The situation, however, ^{changed} in the 1990's when Kenya was denied access as it was not able to meet the stringent Sanitary and Phytosanitary Standards set under the OIE-Codex Alimentarius-World Trade Organization and the importing countries. The purpose of the Sanitary and Phytosanitary measures is to make the public sector accountable custodians of food safety and manage the risks posed by the importation of animals and animal products. As a result, Kenya is increasingly coming under pressure to improve their delivery of veterinary services as a prerequisite for entering the competitive arena of international trade in livestock and livestock products while ensuring wholesome and quality products in the local markets.

The present study determined, described and assessed the animal health care delivery systems in Turkana and Pokot Districts, with the main goal being to provide the necessary information to inform the strengthening of animal health service delivery systems within these and similar areas, and subsequently upgrade and revitalize the existing disease control system to acceptable standards for the control of economically important livestock diseases. The study also determined if and how the choice of veterinary delivery systems, among other factors, influenced pastoral household livestock-dependent incomes.

The present study recommends policy, regulatory and institutional interventions that are essential if the problems related to animal health service delivery in

pastoral household livestock-dependent incomes in the arid and semi arid lands (ASALS) in Kenya are to be sustainably addressed.

Field surveys for collection of information were conducted using questionnaires. A check list was drawn up to socio-economic data for a number of variables which were used to determine factors affecting household income in the two districts. Descriptive and regression analyses were carried out for the data collected and a statistical model fitted. Data collected included information on household income (the continuous dependent variable), herd size, cost of delivery of veterinary services, household size, age of household head, level of education of household age, gender of household age, availability of credit to herders, availability and acceptability of veterinary services, and service demand (independent variables). Transformations and conversions of the data were done for more in-depth analysis.

Results of the present study indicate that the delivery of animal health care services is under-resourced, often requiring staffing and transport reinforcement when specific delivery tasks are to be implemented. The challenging environment that includes long distances between centres, poor infrastructure, prolonged drought, limited communication, insecurity, high service delivery costs and frequent movement of the community and livestock is unfavourable for the delivery of conventional veterinary services by either the private or public sector. From the evidence available from the PRA study, group discussions and direct observations, animal health service delivery by CAHWs in its present form in the two districts, is not sustainable as it is heavily dependent on funding from the

sponsoring NGOs which have no exit strategy, is not supported by a reliable veterinary drug supply system, has poor returns on investment, is not backstopped by the public or private sector professional and has been severely affected by very high desertion rate (>75%) of the trained CAHWs. In addition, though provided with a harmonized training manual by KVB (2004), the CAHW animal health delivery system is not supported by the existing legal and policy framework. This study recommends that the adoption of pastoral field schools, and their domestication as an alternative animal health delivery system, be investigated alongside other proposals advanced to chart the way forward in animal health service delivery in the ASALs. Such action should be supported by the DVS recruiting veterinarians and animal health technicians specifically for the ASAL districts.

While assessing the factors affecting household income, regression analysis was used to predict the dependent continuous variable from a number of independent variables. The squared multiple correlations (R^2) were determined. R^2 is a coefficient that tells how much the variance of dependent variable was accounted for by the joint predictive power of all the independent variables, and a coefficient of 50% is acceptable. The OLS output would also tell if the model allows one to predict a dependent variable at a rate better than chance. This is denoted by the overall F of the model. If the significance is 0.05 (or less), then the model is considered significant. In this study, the ordinary least squares (OLS) provided R^2 and the F values that were found to be too low to be of any significance. Because of the low R^2 in the OLS and the existence of heteroscedasticity caused by herd size, a form of weighting was applied to the data before running an OLS

regression to obtain Weighted Least Squares (WLS) parameters. After weighting, amongst factors affecting household income in Turkana District, the level of education of household size, accessibility to and acceptability of animal health services, distance to veterinary clinics, time taken by the animal health service deliverer to respond to a herder's call and household size were found to significantly influence pastoral household income. In comparison, however, most factors did not show any level of significance in the West Pokot sample, except the acceptability and the cost of animal health service delivery.

The findings of the present study indicated that despite efforts by the government to prioritize intensification of land use, upgrading the quality of livestock and providing appropriate support for the livestock sub-sector in pastoral areas including the target districts, the delivery of animal health services is neither effective nor efficient and thus in its present form, it cannot be relied on to increase pastoral incomes and enhance livelihoods. In addition the chronic shortage of technical and support staff, financial resources and vehicular mobility have continued to weigh heavily on the DVS's ability to provide quality services including emergency preparedness and response in the two districts. The situation in the ASALs is compounded by the existing policy and legal frameworks that have proven to be non-responsive and thus cannot be relied upon to address the prevailing and evolving animal disease dynamics and livestock production and marketing challenges. Unless these policy and legal constraints are adequately addressed it is unlikely that Kenya will regain its place in the international trade in livestock and livestock products.

Greater integration of the private sector and beneficiary communities in various aspects of animal health service and input provision including outsourcing of the private practitioners and pastoral field schools to provide public good services is recommended. Such integration, however, requires the State to develop supportive policy and legal frameworks and to provide adequate physical, financial and human resources.

CHAPTER ONE

INTRODUCTION

1.1 INTRODUCTION

Animal health or veterinary service delivery systems are defined as pathways a veterinary product passes through to reach the end-user. Such a product passes through systems (pathways) of delivery, within which it changes hands through a series of players (supplier and veterinarian) at different levels, from the manufacture all the way to the end user (farmer/herder) (Umali, Feder and de Haan, 1992). According to these workers, livestock/veterinary services can be divided into two major functional categories: health services and production services. Based on their descriptions, animal health or veterinary services consist of curative services, preventive services and provision of veterinary suppliers (production and distribution of veterinary pharmaceuticals), while animal production includes research and extension services, artificial insemination, feed formulation, and marketing services among other things.

Provision of quality animal health inputs and services is key to increased and sustained livestock production and productivity the world over. After the world economic recession of the late 1970s, and the subsequent Structural Adjustment programmes (SAPS) whose effects were felt more in Kenya in 1990s, many developing countries instituted structural reforms some of which targeted the livestock sector, and sought to shift the delivery of veterinary services from public domain to the private sector. The reforms, however, did not work as expected and as

a result, the provision of animal health services to the poor and marginal populations, especially those in pastoral areas, throughout the developing world remains an ongoing challenge. Many developing countries have overburdened systems of animal health care delivery that consistently fails to provide health care in rural locales. Nowhere is this more pronounced than in pastoral areas

(Ahuja, Jan and Arindans, 2003).

The marketing of livestock and livestock products in Kenya is a major economic enterprise that engages many livestock producers, livestock traders and an array of businessmen and women. Livestock marketing is largely in the hands of the private sector, with the local and central governments playing regulatory roles and providing facilitating services. The distribution system of livestock products and by-products is, however, poorly developed. The apparent distribution vacuum has enticed the establishment of many middlemen and middlemen organizations that skew the market against the interests of producers (Jean-François, 2002; Ahuja *et al.*, 2003).

The final act that concluded the cycle of multilateral negotiations known as the Uruguay Round led to the creation of the Geneva-based World Trade Organization (WTO) in 1993, which became operational on 1 January 1995 (Le Brun, 2003). The new agreements on international trade established by the WTO soon had a major impact on the animal health field. Under the new WTO agreements, health barriers replaced the quotas and tariff barriers formerly in operation under the 1947 general agreement on tariff and trade and the Uruguay Round. Any exporting country must now certify the good health status of any animals or animal products it wishes to export. The importing country is authorised to check the validity, veracity and

reliability of the certification received from the exporting country by evaluating the quality of the veterinary services of its trading partners, if necessary.

The overriding concern of countries exporting animal foodstuffs should therefore be to ensure that the organization and operation of their veterinary services is of optimum quality, in terms of both logistics and human resources. In the past, the international markets for livestock and livestock products for Kenya was in the Middle East and European countries, a situation that has changed during the last few years. This is mainly because Kenya has not been able to meet the necessary sanitary and Phytosanitary standards set under OIE-Codex Alimentarius-World Trade Organization (Jean-François, 2002).

This study assesses and describes the various animal health care delivery systems available in selected areas of Turkana and West Pokot districts of Kenya. It also determines the factors among them the choice of veterinary delivery systems, influencing pastoral household livestock-dependent incomes in the selected ASALs of Kenya.

1.2 PROBLEM STATEMENT

In rural communities of Kenya, modern veterinary drugs/medicines are often not available or are being traded (hawked) on a black (illegal) market at prices livestock owners can ill afford. Black market trading also leads to increasing problems of

abuse and misuse of drugs. Private veterinarians have not been able to establish the traditional mode of veterinary practice as they have been found not to be economically viable (Laura, Claire, and Ahmed, 1999; Okwiri, Kajume and Odondi, 2001; Sones and Cartley, 2002). At the same time, government veterinary services have undergone financial and human resource cutbacks and are generally offering increasingly limited and poorer quality services (Institute of Policy Analysis Research (IPAR), 2002).

Unfortunately this is happening at a time when the agreement on the application of Sanitary and Phytosanitary measures has subjected governments and regulatory authorities to public scrutiny and pressure (Bruckener, 2004). The purpose of the Sanitary and Phytosanitary measures is to make the public sector accountable custodians of food safety and to manage the risks posed by the importation of animals and animal products. As a result, developing countries are increasingly coming under pressure to improve their delivery of veterinary services as a prerequisite for entering the competitive arena of international trade in animals and animal products (Bruckener, 2004). The present study analyzed the veterinary delivery systems operational in the ASALs of Kenya with a view to improving their quality and mode of delivery. The study also identified the factors influencing pastoral household livestock-dependent livelihoods.

1.3 STUDY JUSTIFICATION

The mandate of the Veterinary Department of the Ministry of Livestock and Fisheries is to control and eradicate major livestock diseases with a view to increasing animal production and productivity, facilitating marketing of livestock and their products and improving public health through the control of public communication (Government of Kenya, Sessional Paper Number 2, National national food policy, 2008).

Prior to 1980, the livestock sub-sector in Kenya was under the mandate of the Ministry of Agriculture, but there after, the Ministry of Livestock Development was created. However, there have been splits and mergers between the two ministries a number of times since then. This has had a negative impact on the performance of the livestock sub-sector, thus occasioning changes in the priorities to facilitate the development of the sub-sector, various stakeholders who are involved at various stages of livestock production, value addition and marketing chain. These include the Department of Livestock Production and the Department of Veterinary Services, two statutory boards (the Kenya Dairy Board and the Kenya Veterinary Board), and local and international research institutes. There are also a number of non governmental organizations (NGOs) and farmer organizations that make significant contributions to the sub-sector. These institutions, however, have not adequately addressed the challenges faced by the producers in the light of dynamic global environment and market demands. As a result, to date, poor animal health inputs and services remain major constraints to livestock production and productivity in the whole of sub-Saharan Africa. Moreover, projections for the Horn of Africa shows a significant increase in the demand for livestock products over the next thirty (30)

years, mostly as a result of population increase. Projected growth in per capita consumption of livestock products is generally above that predicted for consumption of other food items, offering the opportunities to improve the incomes and livelihoods of the livestock dependent poor. This growth in demand driven for livestock products can, given the right policy and environment, be met largely by in-country production, and is one of the few opportunities to improve the livelihoods of the regions' poor, many of whom are livestock farmers (Robinson, 2009). Therefore veterinary institutions in the developing world need to adapt to the challenges posed by an increase in animal production and trade, and in the movement of animals and products of animal origin, all of which significantly increase the threat of transmission of animal diseases and zoonoses (World Health Organization (Codex Alimentarius WHO)/Food and Agricultural Organization of the United Nations (FAO)/ World Organization for Animal Health (OIE) 2004).

This study identifies and describes the veterinary delivery systems operational in selected areas of Turkana and Pokot districts of Kenya. It also determines the factors influencing pastoral household livestock incomes in selected areas of the two districts, finding out if the choice of veterinary delivery systems is one of these factors. Creating awareness of the constraints will aid and inform the Government of Kenya, through the Department of Veterinary Services, when formulating strategies to address the animal health service delivery systems in operation. The information obtained from the study will be useful for soliciting the support of other stakeholders (NGOs, donors, researchers, and partners) in improving the delivery of veterinary services, not only in Kenya, but also in other countries in the region sharing the same ecosystem.

Information obtained from the study will also be useful as a baseline in doing an evaluation of the performance of veterinary services (PVS) in Kenya as a whole.

1.4 OBJECTIVES OF THE STUDY

1.4.1 General Objective

This research was designed to evaluate, verify and assess the various animal health care delivery services operational in selected areas of Turkana and Pokot districts of Kenya, and how they influence pastoral household livestock- dependent incomes.

1.4.2 Specific Objectives

The following are the specific objectives of the study:

1. To determine and describe the animal health care delivery systems available in selected areas of Turkana and West Pokot districts of Kenya.
2. To determine the factors influencing pastoral household livestock-dependent incomes in selected areas of Turkana and West Pokot districts of Kenya, and to find out if the choice of veterinary delivery systems is one of these factors. ,

1.5 HYPOTHESES TESTED

The following hypotheses were tested:

1. Animal health service delivery in the arid and semi-arid lands (ASALs) is not adequate to improve pastoral incomes and livelihoods.
2. Animal health service delivery by CAHWs has a significant influence on pastoral household incomes.
3. Pastoral livestock incomes are influenced, by among other factors, the choice of animal healthcare delivery system, household size, age of the household head, acceptability, accessibility/availability of veterinary service, cost of service delivery, extension services, education of the herder, gender of household head, availability of credit to household, and herd size.

1.6 STUDY LIMITATIONS

Data and information for the present study were collected over a one year period in Turkana and West Pokot districts. The two districts have very poor infrastructure and are prone to recurrent insecurity which interrupted data collection on several occasions. However, full advantage of the various sources of information available was taken in order to collect as much relevant data as possible within the limited time.

1.7 ORGANIZATION OF THE STUDY

The rest of this thesis comprises seven chapters. The introductory Chapter One gives the general background, problem statement, objectives, significance, limitations, and scope of the study. Chapter Two presents a review of the literature on delivery of veterinary services amongst pastoralists. The main body of the literature focuses on the broad issues that are of major importance to the delivery of veterinary services in pastoral areas, namely, importance of livestock in ASALs, the role of livestock in poverty alleviation and in food security, as well as constraints to increased livestock production and productivity. The chapter also describes veterinary service delivery systems and highlights the various constraints encountered in the delivery. Evaluation of the performance of veterinary services (PVS) is also highlighted in this chapter. Service delivery interventions and the constraints to animal health service delivery in the ASALs are described.

The description of the study area is given in Chapter Three. The chapter elaborates on the geographical location of the study area, veterinary delivery system currently in place, weather, infrastructure, economic and development constraints and sources of livelihoods. Chapter Four describes the various methods used to collect and analyze data. Results are presented and discussed in Chapters Five and Six. Chapter Seven presents summary findings and conclusions. Policy recommendations made from the study are also presented in this chapter.

CHAPTER TWO

LITERATURE REVIEW

2.1 OVERVIEW

The literature review surveys the main topics of the study and highlights existing and alternative livelihoods and the the importance of livestock in the ASALs. It describes the constraints to livestock production and animal health services and inputs delivery; the effects of livestock diseases to the asset base of the poor livestock pastoral producers; livestock marketing, trade and standards; barrier to export markets for livestock; and gives an historical background of Animal health service delivery in the great horn of Africa with emphasis on Kenya. It also highlights the gaps that will be addressed by the present study besides describing in details the evaluation of the performance of veterinary services (PVS).

2.2 ALTERNATIVE LIVELIHOODS IN THE ASALS

The ASALs are not just good for pastoralism as some people may feel. Sudan, for example, has potential as an oil producer, while the country has significant water reserves and an agricultural capacity that could make it a meaningful contributor to regional development once it attains internal stability. Ethiopia, with its huge water reserves and human resources, can also be considered as possible contributor to regional prosperity (Julia, 2001). Africa is emerging as a potentially lucrative market

for Asian electronic technology. Besides, oil has been discovered in some ASALs, and globalization has boosted international trade in some regions (Julia, 2001)

The ASALs should be recognized by all, including policy makers as major land resource-from which many products and services such as livestock, wildlife, recreation, water, minerals, precious stones, timber, fuel wood, medicinal and ornamental plants, honey, frankincense, gum Arabica, fruits and vegetables can be obtained (Robinson and Nyariki, 2005).

Under the prevailing ASAL conditions, very few families totally depend upon crops and livestock for their income. Most of them are involved in activities other than subsistence production, in the non-farm and off-farm sectors. It is in this context that policies that give greater attention to the rural 'informal sector' and activities that link rural villages to national economic networks should be explored (Robinson and Nyariki, 2005). Small rural towns are ideal locations for a wide variety of industries and services, and provide a market for ASAL products such as cereals, livestock products, fruits, vegetables, and honey.

2.3 IMPORTANCE OF LIVESTOCK IN ASALs

Livestock, which is a major part of African agricultural production and consumption systems, play an important role in food and economic security in ASALs through provision of a variety of products and services including skins, meat, draught power, manure, fiber, fertilizer, traction, fuel and capital accumulation that can be traded

(Kariuki and Letitiya, 1998). The ASALs in Kenya support a livestock population estimated at over 30 million, 45% of which are cattle, 28% goats, 24% sheep and 30% camels (Government of Kenya, 2004; Alila and Atieno, 2006). In these areas small stock such as sheep, goats and fowl are convenient items to sell for cash or exchange for other items. Animal products including eggs, honey, meat, milk, blood, bone marrow and crushed bones, absorbable forms of iron, zinc, vitamin B₁₂, retinol and many other minerals are highly essential for maintenance in adults and growth and development in children (Government of Kenya, Sessional Paper No. 2, National food policy, 2008). Moreover, livestock in most rural areas not only serve as a depository but are also easily converted to cash for daily subsistence (Republic of Kenya, Sessional Paper No. 2, National food policy, 2008). Sales of livestock products such as meat, milk and egg generate income and, thus, increase the purchasing power of livestock owners. Livestock and livestock products are therefore the main sources of cash in many smallholder mixed farming systems of the Sub-Saharan Africa (SSA) (Sansourcy *et al.*, 1995). Beneficial income diversification in pastoral areas, therefore, can be based on initial capital generated by livestock sales (Little, Tegegne, and Almaychu, 2001). Moreover, livestock rearing employs the majority of people in these areas, and is by far the largest source of revenue generation (Thornston, Kruska, Henninger, Kristjanson, Reid and Robinson, 2003).

Besides its significant contribution to agricultural gross domestic products (on average 30% of agricultural GPD in SSA) and its invaluable contribution to the food security of the poor, in most countries, livestock are just not mere assets to be managed, they are an intrinsic part of peoples' identity and way of life (Peters, 2002; Poland, Hammond-Tooke and Voigt, 2003; Kirsch, Scorge and Khumalo, 2004).

Anthropologists emphasize social, cultural and spiritual aspects of keeping livestock such as bride price, prestige and investment (Haffernan, 2001; Peters, 2002; Poland-Tooke, Hammond and Voigt, 2003; and Kirsch *et al.*, 2004). Animals also provide opportunities for the utilization of damaged or surplus crops that would otherwise be wasted (Ngowi, Chenyambuga, and Gwakisa, 2008). Maintenance and improvement of animal health, therefore, is a crucial part of producing high quality, valuable and marketable livestock and livestock products (Republic of Kenya, Sessional paper Number 2, National food policy, 2008).

2.4 IMPORTANCE OF LIVESTOCK IN AFRICA

The livestock sector plays a vital role in the economies of many developing countries. It provides food, or more specifically animal protein in human diets, income, employment and foreign exchange (Sansourcy, 1995). For low income producers, livestock also serves as a store for wealth; provide draught power (Sansourcy *et al.*, 1995) and organic fertilizer for crop production, and a means of transport (Winrock international, 1992; Otte, Nuget and McLeod, 2004; Ahuja and Redmond, 2004). Throughout Africa, livestock are a vital source of economic and social support for millions of people, providing food and income, a means of diversifying risks and increasing assets. Draught power, fuel, manure, and transport all contribute significantly to whole farm productivity and the consumption of animal protein improves human health and ability to work (Robinson, 2009)

Livestock production systems vary from backyard rearing of poultry or bees to herding of large mixed herds of camels, cattle, sheep and goats. Livestock provide a critical path for millions in the developing world to escape absolute poverty. For more than 600 million of the world's poorest people, mainly pastoralists, survival and prosperity are almost entirely dependent on the health of their livestock

(Spielman, 2009). In fact, the discussion of food security with reference to grains only is misleading especially for societies that are primarily dependent more on other sources of food other than grains (Blench, Chapman and Tom Slymaker, 2003). A key feature of livestock-keeping is the variety of ways it supports the livelihood strategies of the producers including provision of a steady stream of food and revenue and serving as a reserve (savings) for future needs. In addition, at the small holder level in rural and peri-urban areas, livestock are often the only means of asset accumulation and risk diversification that can prevent a slide into abject poverty (Blench *et al.*, 2003). Livestock therefore have a very important role in achieving food security in SSA (Otte *et al.*, 2004).

Livestock keeping is the main occupation stay of the pastoral systems with livestock incomes accounting for very high proportions of incomes for the pastoralists in Africa (85-95%) and livestock holdings representing the strongest measure of other dimensions of wealth (Laura, Claire and Ahmed, 1999). In addition to direct food production, animals and animal resources also occupy a very special place in poverty reduction programs in many African countries (Laura *et al.*, 1999).

In Kenya in particular, the ASALs cover 80% of the country and support 30% of the population. These areas support 60% of the livestock and 65% of the wild life

(Abdillai, Getachew, Solomon, and Lyne, 2003. Despite the huge potential of the people living in the Arid and Semi-arid areas, these areas have remained outside the mainstream economy of the country, and as result, the areas are characterized by high poverty rates (Isaac and Kalua, 2008).

The significant role played by livestock farming in rural poverty reduction demands a sustained increase in healthy livestock production as an essential tool to poverty alleviation and enhancement of food security in sub-Saharan Africa. Nonetheless, a significant proportion of pastoral households have too few livestock to fully support household members and indeed, it has been approximated that fifteen million livestock keepers in range-land based systems in sub-Saharan Africa are poor according to the national poverty rate (Thornston *et al.*, 2003).

Consumption of meat, milk, and eggs varies widely among countries, reflecting differences in food production resources, production systems, income, and cultural factors. Per capita consumption is much higher in developed countries but the current rapid increase in many developing countries is projected to continue. Total meat consumption in developing countries is projected to more than double by the year 2020, while, in developing countries, it is projected to increase no more, and, in some cases, less than the population growth (Delgado, Rosegrant, Steinfeld, Ehui, and Courbois, 1999). Because most of the world's population is in developing countries, which are experiencing the most rapid growth rates, global demand for meat is projected to increase more than 60% of current consumption by (Delgado, Rosegrant, Steinfeld, Ehui, and Courbois, 1999; Delgado *et al.*, 1999; Ian and William, 2006).

The challenge posed by the livestock revolution demand that resource-poor farmers and consumers reap the benefits of livestock and that the environment and public health are not put at risk in the process. Some of the implications of the livestock revolution for developing country farmers include improved incomes. Evidence shows that the rural poor derive higher proportions of their income from livestock other than do the relatively wealthier (Delgado *et al.*, 1999; Heffernan and Misturelli, 2000). Due to improved incomes, their consumption of livestock products is also increased thus improving their nutritional and health status and consequently their food security. The critical importance of livestock farming for poor farmers is further confirmed by the fact that livestock is often the only capital asset of farming households, which reduces their vulnerability to economic shocks and natural disasters (Mogues, 2006; David, Simeon and Christopher, 2004; Cater, Little, Mogues and Negatu, 2006). It is also a fact that research interventions that enhance productivity add value to livestock products, and hence reduce costs in these systems could generate sizeable economic impact, creating new income streams for large numbers of the poor (Cater *et al.*, 2006).

2.5 EFFECTS OF LIVESTOCK DISEASES ON THE ASSET BASE OF THE POOR

Animal diseases reduce the already limited asset base of the poor livestock keeping households, and currently existing structures and processes offer little assistance in helping the household to respond effectively and contain the often multiple impacts of

disease. The result is a livelihood strategy that must accommodate lower than expected productivity from the household's livestock, and often rules out the risk averse nature of poor households, adopting better management or more productive livestock activities (Perry, McDermontt., Randolph, Sones and Thornston, 2002; Perry, Randolph, Omore, Perera and Vatta, 2005). The outcome is continued low levels of income, asset accumulation and investment, and thus poverty is perpetuated.

In addition, for the poor who do not keep livestock, and who alternatively earn wages from working in off-farm livestock production or marketing enterprises, animal diseases can put at risk one of their important sources of income (financial capital). Most poor urban-are consumers of animal products, and often can only access low-quality products sold in informal, uncontrolled markets. They therefore face a higher chance of contracting zoonotic and food-borne diseases, putting at risk their key human capital (illnesses) and financial capital (wage losses and medical expenditures) assets (Perry et al., 2002; Perry, Ninpratt, sones and Stevens, 2005; Perry, Alejandro, Keith and Christopher, 2005). Poor consumers can also be affected by epidemic animal diseases when outbreaks disrupt markets, create product shortages and raise prices.

Endemic and zoonotic diseases threaten and degrade the asset base of the poor household under current conditions of use of livestock within the household. Whether the household keeps livestock for consumption or market, earns wages from off-farm livestock activities, or simply consumes livestock products, diseases erode the household's assets. Through the continued high exposure to the wide array of risks

associated with animal diseases, and the lack of access to appropriate and effective means to manage those risks, poor households are forced to adopt risk-averse livelihood strategies that do not allow them to accumulate assets or invest in better technologies. These types of animal diseases help to keep the poor in the poverty trap (WHO/DFID-AHP, 2007).

The impact of animal diseases may be due to direct losses and mortality, and indirect effects such as slow growth, and low fertility. Since disease is an important constraint on livestock production in the developing world including the ASALs; development projects that improve veterinary services, or make them more available to the target group, can have a significant impact on rural poverty alleviation (Kariuki and Letitiya, 1998).

2.6 LIVESTOCK MARKETING, TRADE AND STANDARDS

Marketing is an important aspect of any livestock system. It is critical to development of arid and semi-arid lands (John, 2004). It provides the mechanism whereby producers exchange their livestock and livestock products for cash. The cash is used for acquiring goods and services which they do not produce themselves, in order to satisfy a variety of needs ranging from food items, clothing, medication and schooling (Scoones and Wolmer, 2006). Trade in livestock and livestock products is considered an important livelihood improvement opportunity because it helps diversify livelihood sources, as well as provide avenues for adding value to livestock and livestock products, thus, improving returns for the producers. Livestock market improvements

therefore would offer the potential to reduce poverty in areas that are identified as the poorest in ASALs.

However, in Africa in general, areas where livestock raising is the main agricultural activity have the highest incidence of poverty (Thornston *et al.*, 2003). Improvements to the livestock sector offers the most promising opportunity to poverty eradication for first, livestock raising employs the majority of people in these areas, and is by far the largest source of revenue generation in these areas (Thornston *et al.*, 2003). Second, beneficial income diversification in pastoral areas can be based on initial capital generated by livestock sales (Little *et al.*, 2001). Targeted interventions in the livestock sector present the opportunity to reduce poverty, encourage economic growth, and generate capital for use in alternative income generating activities (John, 2004).

Participation in international trade, therefore, tends to create more favorable conditions for poverty alleviation. The livestock farmer can realize the benefits of his/her labour only if she/he has access to a functional market, domestic, regional and international. The starting point would be to ensure that the local and national markets in these countries are working well (Scoones and Wolmer, 2006).

Livestock trade in Africa exists but much of it is informal and is beyond the clutches of customs officials, tax collectors and veterinarians. It is thus very difficult to document this type of livestock trade in Africa. Livestock are moved across-borders, sold on to middle men and traders and may appear in statistics of export in other non-origin countries. Moreover, stratified and barter systems exist which allow

producers to sell their stock for fattening and selling on to others in exchange for other stock or cash, making it difficult to assess the origin of the animals as well as what offtake rates exist. In areas where such markets exist for example in parts of Kenya, Ethiopia, Somalia, Djibouti and across the Sahel, marketed off take is high (Manhoud, 2001; Aklilu, 2002).

The potentials for export sales of livestock from Africa alone are enormous. For example between 1997 and 2001, Somalia alone exported 2.55 million sheep, 0.83 million goats, 70, 770 camels and 33, 310 cattle through formal trade channels (Belachu and Hargreaves, 2003). In Kenya alone, the total value of livestock production amounted to KSh 15.5 billion in 2001 according to the central bureau of statistics statistical abstract 2002 (Livestock and livestock products production and marketing systems in kenya 2003). Global consumption, production, and trade of livestock products have increased rapidly in the last two decades and are expected to continue (David, Simeon and Christopher, 2005). Africa is able and should capitalize on its enormous wealth in livestock, gain access to new markets opening up in Asia and particularly the relatively affluent and nearby Middle East. This could be the key to the much needed growth impetus for stagnating agricultural economies (Blair, 2005). But investments in rural infrastructure to underpin market access and the sustainable development of livestock resources are required (Mpyisi, 2007). More specific assessments of the African Livestock sector have highlighted the need for a pro-poor livestock development focus (International Livestock Research Institute (ILRI), 2000; Heffernan *et al.*, 2003; Hall, Ehui and Delgalo, 2004; International Fund for Agriculture Organization (IFAD) 2004; Owen *et al.*, 2005; Ashley, 2004 and world

bank, 2001), relating to the increasing emphasis on the role of greater market access for agricultural products from the developing world as a pathway out of poverty (Perry *et al.*, 2002).

Marketing remains one of the greatest challenges in the development of the livestock industry in Kenya. In spite of the emergence of organized market intelligence particularly in relation to prices at terminal markets, the lack of and need for price information in many of the pastoral areas remains a critical concern by producers, traders, and policy makers (Gatarwa, 2006).

Linking livestock producers to the expanding markets for livestock products requires significant policy shifts both at National and regional levels, particularly in a changing economic environment, with tendencies towards withdrawal of government services and control over the sector, and increasing privatization (Robinson, 2009).

2.7 CONSTRAINTS TO INCREASED LIVESTOCK PRODUCTION AND PRODUCTIVITY

Africa as a whole is experiencing enormous challenges in maintaining adequate food security and improving livelihoods under rapid population growth and shrinking per capita land area. These challenges are particularly pronounced in arid and semi arid lands (ASALs). Land degradation is increasingly becoming a common feature in these environments as the inhabitants, involved in their traditional pastoral production systems attempt to keep pace with the increased demand for food and other

products. (Gichaga, 1999). Generally, pastoral systems in Africa are characterized by increasing instability, food insecurity, poverty and environmental degradation. Increases in human and livestock populations, decreases in the availability of grazing lands, recurrent drought, and inappropriate development policies have been forwarded by many as causes of the negative trend in most pastoral systems in Africa (Getacheu, Solomon, Seyoum and Layne, 2005).

Moreover, the continent is endowed with immense and diverse livestock resources, which, if utilized optimally, could contribute significantly towards ensuring long-term food security and foreign exchange earnings. It has been increasingly recognized that the livestock sub-sector has potential for earning substantial foreign exchange and transforming the living standards of communities depended on the sub-sector. However, due to a myriad of reasons, the full production and economic potential of the African livestock sub-sector has remained largely untapped and thus its contribution to the respective economies is not commensurate with its size and full potential. For example, full access to external markets, that is essential to exploitation of such potential, is constrained by animal health standards and quality parameters that are currently not being achieved by some of the local producers. This is further compounded by the trans-boundary nature of livestock diseases, which require regional approach to animal health surveillance and monitoring (Getacheu *et al.*, 2005).

Value addition initiatives in the livestock sub-sector are mainly constrained by inadequate supportive infrastructure such as roads, electricity, and water, in addition

to investments disincentives arising from high taxes and un-conducive regulatory frameworks.

2.7.1 Constraints related to livestock diseases

Livestock production is beset by several constraints, one of the most important of which is livestock diseases. Poor animal health is one of the major constraints of livestock production in the whole of sub-Saharan Africa. Animal diseases pose a particular threat to poor livestock-keepers and this is indicated by several surveys of poor livestock-keepers (Ashley and Nanyeenya, 2002; Catley, Leyland and Kaberia 2002; Thornton *et al.*, 2002). The effects of animal health problems on livelihood are multifaceted. Diseases not only cause the loss of animals, but may also affect livelihoods in other less tangible ways. Typical observations are that livestock keepers are largely unable to access animal health services either because the services are felt to be too distant and difficult for small-scale producers to attract, or because the services provided are prohibitively expensive once transportation costs are factored into the fees (Brian, Alejandro, Keith and Christopher, 2005).

Moreover, the widespread prevalence of economically important animal diseases, especially those that are highly contagious and trans-boundary in occurrence such as Foot and Mouth Disease (FMD), Rift Valley Fever (RVF), Contagious Bovine Pleuropneumonia (CBPP), *Peste Petites des Ruminants* (PPR), and Rinderpest have hampered the development of the sub-sector (FAO, 2002; Carlos, 2007). These diseases constantly reduce Africa's capacity to achieve self-sufficiency in food proteins, to assure livestock owners' welfare and continue to pose significant

impediments to national, regional and international trade in livestock and livestock products. Moreover, these diseases have quickly taken prominence and are major non-tariff barriers to trade in livestock and livestock products between the region and the rest of the world, especially the lucrative European and Middle East markets (FAO, 2002).

In Africa these diseases alone cause annual losses estimated at US\$ 4 billion either directly (e.g. through mortality and abortions) or indirectly as a result of depression of growth rates, diminished productivity, lower fertility or total fertility loss, loss of manure and decreased work capability as well as through resources that have to be put into disease control interventions, morbidity, and decreased work rate (Carlos, 2007). In sub-saharan Africa alone, diseases cause 24% reduction in livestock production. Documented evidence shows that even sub-clinical diseases can lower livestock productivity by 20% (Carlos, 2007).

Other factors affecting productivity include poor livestock husbandry practice and management, poor nutrition both in quantity and quality, and poor marketing infrastructures. All these factors restrict the poor from exploiting market opportunities for their livestock and livestock products (Alejandro, Ehui and Samuel, 2007; Njau, 2008). Moreover, safety concerns regarding human and animal disease associated with livestock products are increasing. Efforts to increase public health safety standards aimed at legitimately reducing the risks of human and animal disease have focused internationally on standards to regulate the movement of livestock (Brian *et al.*, 2005). As a result, poor livestock keepers are left with access to mainly local markets.

Livestock keepers have to move animals across borders to markets in neighboring countries. Their free and unregulated access to markets has in part been due to the lack of or lax application of animal sanitary controls, which has undoubtedly been appropriate for the needs of local markets and consumers. Where sanitary controls are applied especially by the governments, a parallel informal market usually exists, in which the poor can sell at lower prices their livestock goods that do not meet standards. For the poor, the impact of livestock diseases on lives and livelihoods is particularly severe; indeed, an outbreak of disease can mean the difference between sufficient food stocks and food insecurity, between having a secure income to the loss of key household assets. The importance of the livestock sub-sector and its potential contribution towards eradication of poverty and food security of households therefore, constitute a legitimate case for more attention in terms of resource allocation and investment (Kitalyi, Mewbaze, Muriuki, Mutagwaba and Lungu, 2006).

Sub-Saharan African (SSA) countries offer unique challenges to the delivery of animal health services, which in turn affect animal production and, therefore, food and economic security. These areas are underserved due to a combination of factors. These include political, cultural, infrastructural, personal insecurity; harsh environmental conditions, nomadism, low level of literacy, inadequate input supplies, poor economic status of the inhabitants and remoteness. In some regions of SSA, these problems are compounded by civil war and the breakdown of veterinary services. The communities are trapped in a vicious cycle of poverty and insecurity due to persistent cattle rustling, counter raids, shortfall in services and infrastructure provision and absence of opportunities (Mohamud and Ruto, 2005). Unfortunately,

livestock services in SSA have historically been accorded a low priority in government, reflected by the frequent reorganization of the veterinary service and their comparatively low ranking, in terms of resource allocation (FAO, 1999).

Changing concepts regarding the role of government resulted in budget cuts and reduced support for the large number of tasks the public veterinary services traditionally performed and as a result, financial constraints and changing government policy on provision of services have severely curtailed the quality and the effectiveness of veterinary services being provided (WHO/FAO/OIE, 2004). The impact of these financial shortfalls was felt more in the ASALs, which were already disadvantaged by having inadequate numbers of veterinary personnel, poor infrastructure, high degree of insecurity and recurrent drought.

Pastoral areas of Kenya, however, offer unique challenges to the delivery of animal health services, which in turn affect animal production and, therefore, food security. Currently, the delivery of these services is inefficient owing to poor infrastructure, conflicts, harsh environmental conditions, nomadism, low level of literacy, inadequate supplies of inputs, poor economic status of the inhabitants and remoteness (IPAR 2002). Poor veterinary services are a particular problem in more remote areas, with harsh environments, difficult terrain and poor infrastructure. In some regions, these problems are compounded by the breakdown of infrastructure. Since disease is an important constraint on livestock production in Kenya; development projects that improve veterinary services, or make them more available, can have a significant impact on rural poverty alleviation (Laura, Claire and Ahmed, 1999)

2.7.2 Constraints to disease surveillance

The objective of an animal disease surveillance system is to support the planning, implementation and evaluation of veterinary intervention programmes. Although the final output of the surveillance system may well be a communication or a report to the decision makers, it is how that information is used that is the ultimate objective of the surveillance system (Hallaj, 1996). In most cases in Africa, disease surveillance does not receive the importance it deserves, which is reflected in the inadequacy of the resources allocated to and the organizational set up of the systems in most countries. Although there may be surveillance guidelines available in most countries the scheme for flow of information from its source (livestock farmer) to the decision making levels and the feedback mechanisms are not usually clear (Hallaj, 1996). At the same time, responsibilities for surveillance activities at each level of the veterinary delivery systems are not well delineated in most cases (Hallaj, 1996).

The presence of livestock diseases still provides importing countries with the legitimacy for barriers to trade, and as a consequence the importance of reliable animal disease surveillance has increased. However, the economic consequences of reporting the occurrence of notifiable and other related important trans-border diseases have also increased, as this provides trading partners with sufficient reason to impose an embargo that could severely compromise the National Agricultural Industry. The dilemma for some developing economies, reliant on agricultural exports, is how to balance a transparent and efficient disease reporting service, sufficient to provide the necessary information for importing countries to make

realistic risk assessments, with the perceived political and economic damage from being honest with trading partners who might take advantage of the information to require additional safeguards and health certification (Kitching, 2000). The situation is more complicated where livestock owners may fail and/or are unable to report diseases to the relevant authorities for fear of livestock quarantines that may be result in closure of local livestock markets leading to loss of income. Culling and/or slaughter are the worst case scenarios of consequences of disease control (Kitching, 2000).

2.7.3 Constraints associated with the evolution and provision of extension services

Extension is defined as a series of embedded communicative interventions that are meant, among others, to develop and/or induce innovations which supposedly help to resolve problematic situations (Leeuwis and Van den Ban, 2004). Agriculture is the main livelihood and access to information is generally costly. But despite this the importance of agricultural extension in rural development is widely acknowledged, particularly in developing countries where the majority of the population lives (FAO, 2003).

Since Kenya's independence in 1963, agricultural extension services were largely provided by the government until the late 1990s, when the state adopted IMF and WB sponsored institutional reforms including privatization of "non-core business". As part of these reforms the established modes of delivery of extension services began to shift in favor of those that involved farmers in the design or prioritization of these

services. This orientation of extension towards participatory processes was catalyzed by the increasing realization that effective and sustainable extension programmes could only be achieved with the more active participation of the various end-users, especially farmers (FAO, 2003).

The quality and extent of extension service provision continued to deteriorate, until the government established the Kenya National Agriculture and Livestock extension Program (NALEP) with funding from Sida in 2000. The NALEP is implemented through the ministries of Agriculture, livestock and fisheries development. The results of an impact assessment done in 2006 indicate that the NALEP approach is highly relevant in addressing the current opportunities and constraints faced by majority of Kenyan rural population (Melinda, Hans, Jeremy and Jane ,2006).

2.8 Contribution of livestock to gross domestic product in Kenya

2.8.1 Contribution of livestock to the general economy and pastoral livelihoods

Agricultural sector is the dominant sector in the Kenyan economy accounting for approximately 24% of the country's Gross Domestic Product (GDP) in the last five years. The sector is currently the largest foreign exchange earner for the country and provides employment and livelihood to a large percentage of the country's population. An estimated 75% of the population depends on the sector either directly

or indirectly. Investment in this sector remains as a matter of policy, a priority for the Kenyan Government (Export Processing zone, 2005).

The ASALS cover 80 % of Kenya's landmass and support 30% of the country's population. These areas also support 60% of the livestock and 65% of the wildlife populations (Makonnen, 2007; Government of Kenya, 2007). The livestock sector in Kenya contributes 10% of the GDP and comprises mainly dairy and meat production, eggs, hides, skins and wool from cows, sheep, goats and poultry. Red meat, comprising beef, mutton, goat and camel meat, accounts for over 80% of all the meat consumed locally. About 67% of the red meat is produced in the arid and semi-arid lands (ASALS) under pastoral production system (Export processing zone, 2005). Unfortunately in Kenya, many of the poor living in the rural areas are engaged in livestock husbandry and livestock production is central to the livelihood systems of many communities living in the arid and semi arid zones for they provide their major, or even sole, source of cash income for normal purchases.

2.8.2 Kenya's export for Livestock and Livestock Products

Kenya's export markets for meat products include United Arab Emirates (UAE), Tanzania and Uganda, while the main markets for hides and skins are Germany, United Kingdom, Netherlands and Italy (Waithaka, 2009). The value of meat products exported increased from Kshs. 281 million in 2003 to Kshs 1,380 million in 2008, while the quantity of hides and skins exported increased from 13,910 tonnes in 2003 to 33,507 and 63,086 tonnes in 2007 and 2008 respectively (Director of veterinary services Kenya, 2008).

2.8.3 Constraints to Export Market

The challenge to accessing the export market is enormous and revolves around international concerns for food safety, quality assurance or origin of animals, and certification of animal health. Tariff and non-Tariff trade barriers such as the '*Office Internationale des epizooties*' (OIE, Paris), Sanitary and phyto-sanitary standards have made it difficult for developing countries to export livestock and livestock products to the European Union (EU) (IPAR, 2002). At the same time, safety concerns regarding human and animal diseases associated with livestock products are increasing. Efforts to increase public health safety standards aimed at legitimately reducing the risks of human and animal disease have focused internationally on standards to regulate the movement of livestock (Perry *et al.*, 2005).

Given the problems plaguing the delivery of animal health services in Kenya following liberalization, attaining the standards poses a big challenge to the meat sector. Moreover, some diseases including Rift valley fever, Foot and Mouth Diseases and Rinderpest, restrict exploitation of market opportunities for livestock and livestock products by livestock owners. Livestock keepers generally have open access to local and regional markets. For example in pastoral areas, livestock keepers have even been able to move animals across borders to markets in neighboring countries. Their access to these markets has in part been due to lax application of animal sanitary controls, which has undoubtedly been appropriate for the needs of local / regional markets and consumers (ILRI, 2000). If this trend continues, Kenya could lose its entire export market share for livestock and livestock products because of its inability

to control various animal diseases and maintain high health standards, a situation that could affect mostly pastoralists (IPAR, 2002).

Due to competition and other non-trade barriers placed by countries in the Middle East (ME), USA and European Union (EU), other markets such as the South Asia region and other African countries represent the main potential market for Kenyan beef. The EU and USA can be virtually ruled out for the foreseeable future and would most likely follow export developments in the Middle East (Aklilu, 2002). The traditional live animal trade to the ME is threatened due to recurrent ban slapped, the latest of which was in 2006-07 due to Rift Valley Fever (RVF) outbreak. The ban on animals from Somalia and Ethiopia allowed countries such as Australia and New Zealand to significantly increase their market share at the expense of the affected countries. In response the Somali traders have turned to trading in chilled meat to take advantage of the short distance between Somalia and the ME markets. This typifies the risk and uncertainty that characterizes this ME live animal market. The ability of Kenya to meet the new and emerging livestock and regulations recently issued by the Middle East countries will be challenging, if not a definite non-trader barrier (Aklilu, 2002)

2.9 VETERINARY SERVICES DELIVERY SYSTEMS

The delivery of services in animal health and production is a very crucial factor in successful livestock development. These services include a number of functions and activities in the areas of input supply and quality control, preventive and curative

veterinary medicine, technical assistance and extension, research, commercialisation, marketing of products, and others. Delivery of livestock services involves a system composed of governmental institutions and to a greater or lesser extent, organisations and individuals belonging to the private sector. Whereas the efficiency and quality of service delivery is closely related to the business management skills of the individual service supplier as well as to the proper co-ordination and balance between the actors of the service system (Kleemann, 1999), utilization of these services depends on the appropriateness of the delivery systems for the specific disease control products and their associated services to herders/farmers. Whether or not such a system function well enough to meet the needs of the farmers depends on a number of issues namely:

- 1) Effectiveness is the ability of the pathway to deliver a product in the form intended. For example, the need to maintain a cold chain all along the delivery chain for a product requiring refrigeration such as a live vaccine.
- 2) Enforceability refers to the ability of the veterinary authorities and the supporting law enforcement agencies ensuring adherence to the provisions of the relevant policy and legal frameworks.
- 3) Equity refers to equal distribution such that the product reaches not just the well to do farmers who have more resources but also resource poor farmers.
- 4) Efficiency is the cost associated with each delivery pathway.

In general, an efficient service is defined as one that makes the best use of its resources in order to satisfy the needs and demands of clients and beneficiaries, strengthening at the same time its own unit and members (Kleemann, 1997).

The three components of service efficiency are:

1) **Service quality**, determined by the client, supplier or external expert, is a measure that indicates up to what point something or experience corresponds to a need, solves a problem or generates utility for somebody. This involves factors such as confidence in the supplier, access to service without obstacles, responsiveness, willing to provide the service, reliability, delivery of the service at the designed time, competence, favourable-adequate cost-benefit ratio, communication, quantity of services in terms of numbers of veterinary personnel involved in animal health delivery system, effectiveness of service, ratio of animal health deliverers to animals (e.g. cow: veterinarian ratio), timeliness of service delivery, regularity, sustainability, significance, effect of the services, recognition of the services and how the stake holders feel about them, availability of drug shops and the quality of drugs, farmer awareness and utilization of the existing services, adequacy and accessibility of the services and how far the service delivery is fulfilled in relation to expectation, time taken and quality of work done (Kleemann, 1997).

2) **External effects** are the results or impact a specific service has on the affected groups of users, clients, beneficiaries and others. These effects include: effects on animal production and health, economic effects at farm level, gender-related effects

at farm level, psychological effects on clients and socio-economic effects on the national economy (Kleemann, 1997).

3) **Internal effects** are the ones a service has on the delivering organization, unit or person, i.e. on the supplier. A service cannot be efficient and sustainable if it is harmful to the service supplier. There is much damage a service could cause to the supplier. Its delivery could result in, among other factors, economic losses, health problems of delivering persons, loss of image of the supplying organization, and demotivation and increased turnover of staff (Kleemann, 1997).

In the case of livestock production in most developing countries, service provision to farmers remains poor and has often been associated with weak or inappropriate delivery systems (Ahuja and Redmond, 2004).

2.9.1 Constraints to animal health service delivery in ASALS

2.9.1.1 *Effects of the structural adjustment policies*

The provision of animal health care (AHC) in sub-Saharan Africa has been the responsibility of the state veterinary services for many years. Private veterinary services were non-existent or, if present, located in more lucrative urban areas (Van, Thys, Elyn, Marcotty and Geert, 2004). Following the slow growth of many African economies in the late 1970's, the world Bank and other international development partners sought to move certain aspects of delivery of animal health services from the public domain to the private sector (FAO, 1999). Livestock services were among

the first rural services targeted for privatization under the structural adjustment programs, particularly in sub-Saharan Africa (Young, Kajume, and Wanyama, 2003). The increasing demand for AHC and the economic crisis of the 1980s have had a significant impact on the public sector provision of various social services, including AHC. Budgetary allocations for veterinary departments decreased gradually until state veterinary services became almost dysfunctional (Young *et al.*, 2003; Van *et al.*, 2004).

International experts made bold efforts to retain veterinary regulation and management of epizootic diseases within the public domain but pushed curative animal health care into a private market. This restructuring was, however, implemented hurriedly before the establishment of alternative suppliers within the private sector and the enactment of policies and legal frameworks that could assure quality of animal health services (FAO, 1999). To compound the situation the veterinary profession and authorities were very slow to respond, and the increasing financial constraints effectively paralysed government services by the late 1980s and early 1990s (Young *et al.*, 2003).

The combination of poor financial resources and an inadequately organized Veterinary Services has often led to deterioration in animal health services, with endemic diseases frequently spreading unchecked. The resurgence and unchecked spread of diseases such as PPR and CBPP in many parts of Africa can be related to the breakdown of national veterinary services. Control of ticks and tick-borne diseases such as ECF has deteriorated, in many cases along with provision of healthcare to pastoral communities (FAO, 2002). As a result, SAPs for sector reforms

have not resulted in adequate provision by the private sector and civil society of essential services and markets as was intended. The result is that the great majority of the rural poor do not enjoy access to the range and quality of services and markets that they need to support a robust livestock related livelihood.

2.9.1.2 *Constraints related to infrastructure*

Pastoral areas in the horn of Africa are characterized by their large size, limited development, poor infrastructure and insecurity. Human populations tend to be small, highly mobile and difficult to reach unless on foot or in a four-wheel drive vehicle. Besides, given that markets in the sub-Saharan Africa are thinly spread, institutions for contract enforcement are weak, and infrastructure is underdeveloped, the veterinary service privatization program has had varied impact in different regions, with these marginal areas receiving minimal attention (Young *et al.*, 2003; Irungu, Mugunieri and Omiti, 2006).

2.9.1.3 *Financial constraints and changing government policies*

Financial constraints and the changing government policy on provision of services in many developing countries have severely curtailed the quality and the effectiveness of veterinary services being provided. The current trend is for the government veterinary services to be decentralized and for clinical and preventive animal care to be handed over to the private sector (FAO, 1999). Whilst this has had some success in areas of high agricultural potential, professional success rates in rural areas have been low (FAO, 1999). The impact of this is being felt more in the ASALs, which are already disadvantaged by having inadequate numbers of veterinary personnel, poor infrastructure, high degree of insecurity and recurrent drought (FAO, 1999, Young *et al.*, 2003; Irungu *et al.*, 2006; Njau, 2008).

In Kenya for example, the government animal health department provides curative, preventive, public health and extension services to the farming communities (Njau, 2008). However, in pastoral areas, the government services have been almost exclusively aimed at controlling two main cattle diseases namely Rinderpest and contagious bovine pleural pneumonia, which is often done at the expense of other animal species and diseases. Other common diseases in pastoral areas that are a major constraint to livestock production and which also need to be targeted include Rift Valley Fever (RVF), contagious caprine pleural pneumonia (CCPP), Foot and Mouth Disease (FMD), mange, non-specific diarrhoea, orf/pox, enterotoxaemia, mastitis, anthrax, black quarter, ringworm and endo and ectoparasitosis. Peste petits des ruminants (PPR) has killed three million goats and sheep over the last two years alone and another 26 million sheep and goats across the north eastern region are at risk. More deaths would greatly compromise the supply of red meat to Kenya's urban areas, and further fuel the growing food crisis (Dagi, 2008).

Furthermore, as regards clinical veterinary service delivery especially in rural or more remote areas, the solution fostered by development partner investments which involves deregulation and the deployment of privately operating paraprofessionals commonly referred to as community animal health workers, is often perceived as a threat to the veterinary profession and may result in limiting access to international markets for the trade of livestock and livestock products (Woodford, 2004).

Moreover, although livestock owners in ASALs are willing to pay for drugs and services, the demand for quality products is not satisfied by the existing illegal and

“black market centred” drug supply system (IPAR, 2002). Most of these ASAL livestock owners use commercial veterinary drugs and, to a lower extent, vaccines from “hawkers”, who sometimes barter them against goats (Irungu *et al.*, 2006). While vaccines are not used in most cases because of poor availability, poor handling and quality reduces the efficacy of those available (Irungu *et al.*, 2006). The researchers also noted that the pastoral livestock producers had to walk long distances to access services and buy these inputs of suspect quality and efficacy.

2.9.1.4 Weak Legal frame-work and Institutions

The key weaknesses of legal and institutional frameworks that support the livestock industry include: regulation and facilitation of services such as animal breeding services, feed production, privatization of veterinary services, regulation of veterinary drugs, resolution of livestock/wildlife conflicts, quality assurance of livestock inputs and products, coordination of research and extension, information as well as monitoring and evaluation of projects and programs (Government of Kenya, sessional paper no 2 of 2008). In addition there are no mechanisms in place to identify the constraints to livestock production, the service needs of poor livestock keepers and the ways and means to deliver them at affordable costs. The policy priorities and directions for service delivery often get determined by the biases and beliefs of the decision and policy makers. More over, lack of strong institutional support such as provision of credit facilities, research and policy, legal and regulatory frameworks has exacerbated agricultural woes (IPAR, 2002). Unfortunately there is no consensus among the livestock sector professional as while veterinary scientists argue that it is the poor animal health which is the main constraint to livestock

production, the nutritionists point to the poor availability of feed and fodder and the breeders point to poor and mismatched genetics (Ulrike and Haja, 2006).

2.9.1.5 *Research and extension*

Africa is still at earlier stage of scientific and institutional development. Institutions of higher education, research and extension are, in general, poorly staffed, ill equipped and under-funded to provide the scientific and technological foundations of a structural and sustainable transformation of the national food and agricultural system. As a result, these systems remain largely ineffective for developing and extending technologies that respond to farmers needs.

Kenya is trying to revitalize its extension services. The Sida supported Kenya National Agriculture and Livestock extension (NALEP) started in July 2000. The program is implemented through the ministries of Livestock, Agriculture and Fisheries, and its approach is in line with the Kenya Government policy on decentralization as well as on agriculture as documented in the revitalization of Agriculture (SRA) and the National Agricultural Policy (NEAP) (Melinda *et.al.*, 2006).

3.0 TRENDS IN ANIMAL HEALTH SERVICE DELIVERY IN KENYA

3.1 THE COLONIAL ERA: PRIVATE VETERINARY PRACTICE

During the colonial era and immediately post-independence era, most clinical veterinary services in Kenya were provided by private practioners and 'veterinary

scouts'. The private practitioners were confined to high potential areas, mainly in the so-called white settler areas. Veterinary scouts were local livestock keepers who received informal training from local veterinary staff, were employed by the county council and seconded to the government. They lived in the villages and provided clinical and other services to the communities. The provision of private animal health services were, and still are, mainly governed by the Veterinary Surgeons Act (Cap 360) and the Pharmacy and Poisons Act (Cap 244). The currently used Veterinary Surgeons Act in Kenya was borrowed mostly unchanged from the British Veterinary Surgeons Act (Young *et al.*, 2003). The Act, in its current state, broadly limits the practice of veterinary medicine and surgery to registered veterinary surgeons. However, it has two clauses that add recognition of the fact that many of larger commercial farmers of the time provided their veterinary services. These clauses allow anyone to treat their own animals, or those belonging to his neighbors, provided it is not done for profit. The Pharmacy and Poisons Act limited, and still limits the sale of pharmaceuticals (including veterinary pharmaceuticals) to registered pharmacists. Veterinarians were only allowed to keep limited stocks of drugs for their own use while treating animals, but they were not, and are still not allowed to sell them (Young *et al.*, 2003).

3.2 THE 1970S: FREE SERVICES FOR ALL

Government of Kenya, sessional paper 1 (1965) 'African Socialism' set the scene for a massive increase in government livestock services to be provided either for free or at highly subsidized rates throughout the country, and massive investment in professionalisation of the veterinary service (Umali *et al.*, 1992). Veterinary services

provided included tick and tsetse control, preventive services (vaccinations, disease control and pest eradication) and veterinary laboratories. At the same time, the state also employed all the veterinary graduates completing training from the University of Nairobi. Veterinary scouts at the village level were gradually phased out and replaced by veterinarians and animal health technicians (AHTs), based at divisional and locational levels respectively (Young *et al.*, 2003). The private practitioners, many of who were expatriates, went out of business. Although clinical services became more accessible in the high potential areas, the situation did not improve much in the arid and semi-arid areas (ASALs) because relatively fewer veterinarians and AHTs were posted there. They could not reach the ASAL nomadic herds because of the vast distances, poor terrain and poor road network.

3.3 THE 1980S: THE STRUCTURAL ADJUSTMENTS AND THE DEVELOPMENT OF COMMUNITY-BASED ANIMAL HEALTH DELIVERY SYSTEMS.

Government of Kenya, sessional Paper No 1 (1986) 'Economic management for renewed growth' set the stage for structural adjustment within government and the gradual privatization of public services. Budget restrictions also began to bite in the late 1980s and the government stopped employing all veterinarians and AHTs on graduation in 1988, and froze recruitment into vacant posts (Young *et al.*, 2003). As a result of the gaps created by Structural Adjustment Programs (SAPS) in veterinary service delivery, various organizations noted the poor development of veterinary services in some areas of the world where livestock were highly valued, both socially and economically (Tambi, Mukhebi, Maina and Solomon 1999; Leyland, Akwabwai

and Mutungi, 1999; Munyua and Kahi, 1999; Young *et al.*, 2003; Catley, Leytland, Mariner, Akabwai, Admassu, Asfaw, Bekele and Hassan, 2004; Woodford, 2004; Rubyogo, Murithi, Agumbah and Obhai, 2005). Challenges in delivery of veterinary services brought about by structural adjustments were more pronounced particularly in more remote areas, with harsh environments, difficult terrain and poor infrastructure. In some regions, these problems were compounded by civil war and the breakdown of veterinary services and infrastructure.

The dry land regions of Africa and India, the mountains of Nepal and Afghanistan, and the forests of Southeast Asia demanded new approaches to veterinary care in places where veterinarians were either unable or unwilling to venture. Non-Governmental Organizations (NGOs) such as the Intermediate Technology Development Group (ITDG), OXFAM UK/Ireland and Farm Africa began to look at these problems from an appropriate technology perspective, which aimed to make best use of local livestock knowledge and husbandry skills. The primary objective was to supplement and support the existing professional system for delivering such services to marginalized communities in rural areas. The CAHWs programs were started in the belief that they would encourage the participation of the local communities in the design and delivery of animal health services, this being seen as one of the ways of empowering marginalized communities (Stem and Sode, 1999; Kajume, 1999). In addition, it had been argued that the CBAHWs model provided the framework for the full privatization of animal health services in marginal areas (Stem and Sode 1999; Kajume, 1999).

Different approaches have been used in different countries. Although numerous terms have been used to describe these programs, the programs share similar features and goals. First, the community members select individuals amongst themselves for training based on their criteria such as trust, honesty, and friendliness. The training concentrates mainly on important livestock health and management issues. On completion of training (which normally takes up to two weeks), these individuals, who become known as 'paravets', 'bare foot vets', 'basic veterinary workers', 'Community Animal Health Workers' (CAHWs), 'Animal Health Auxiliaries' (AHA), 'village vets' (VVS), 'Community Livestock Workers' (CLWs) and other names in local languages, work with the communities in providing basic animal health care services, and the livestock keepers pay for services provided as one way of sustaining the program (Mugunieri, Irungu and Omiti, 2004).

In Kenya, other development agencies, particularly Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) established programs using primary level veterinary workers model in use in Thailand, Somalia and Afghanistan. In 1997, similar programs were started in Ghana, Togo, Sudan, Yemen, Hatinh and Vietnam . The general procedure is that a lay person preferably and livestock producer is given a week or so of rudimentary training to become a CAHW, who is then launched into practice after being given a basic "veterinary kit". The kit basically contains vaccination, dressing and castration equipment and supplies in a durable leather bag with a wide mouthed thermos flask for vaccines. Limited drugs are usually supplied but the CAHW is expected to replenish them him/herself with the money s/he earns from the practice. In some of the countries including Ghana, Sudan Zambia and Kenya each CAHWs is also provided with a bicycle (Laura *et al.*, 1999).

However, many CAHW projects have been faced with sustainability problems, the performance and proliferation of the programs in many countries being constrained by several major factors. This is partly because there is inadequate information on their performance and partly because the programs were implemented before the necessary changes in the existing legal, policy, and institutional frameworks had been made and as such, they have been operating illegally (Munyua, Farrah, and Wabacha, 1999; Munyua, and Kahi, 1999; Munyua and Wabacha, 2003; Mugunieri *et al.*, 2004). Moreover, where these programs have been developed, no accompanying independent studies have been undertaken to assess their impact. Also, the factors that may influence their success and sustainability have not been fully established and documented. Finally, Community Animal Health Programs (CAHPs) models were based on wrong premises. Implementing agencies and NGOs, who were the main driving force, are actually not permanent participants in local projects and tended to change their agendas in response to development partner priorities. They have traditionally taken decisions and implemented these programmes without consultation with local public and private sector actors. Moreover, CAHWs depend on veterinary medicines that are provided by the Government or NGOs, often at subsidized rates. In Government systems, drug procurement and delivery are often bureaucratic and subject to the 'diminishing revolving fund' syndrome. Even NGO projects which started successfully collapsed when funding was withdrawn or the NGO closed the project for other reasons. Therefore, sustainability is still a key issue in CAHWs programs (Laura *et al.*, 1999).

The CAHWs approach has also raised a number of other important questions. These are:

1. Legalization of CAHWs "practice" including access to animal health inputs in some countries
2. The criteria that should be used to select CAHWs
3. Constraints while practicing
4. The target group and what should be their literacy level
5. The duration of the training course, and what it should involve (Curriculum)
6. The sort of follow up and impact monitoring that should be performed

These issues are important in terms of both quality and sustainability (McCorkle, 1997). This researcher suggested some conditions that make it more likely that a CBAHW would continue working after the end of the project including:

1. Acceptability to the community
2. Refresher training and follow up during the project; and
3. Access to professional support and drugs after donor support has been withdrawn.

3.4 SERVICE DELIVERY THROUGH REVOLVING DRUG FUNDS (RDFS)

Other approaches of funding animal health service delivery that have been tried in ASALs include creation of Revolving Drug Funds (RDFs) and creation of community organizations such as co-operatives that retain a veterinarian on a collective basis

(Omore, McDermont, Staal, Arimi, Kangethe and Ouma, 1997). Holden *et al.*, (1996) pointed out that such arrangements are skewed against the poor farmers while Omore *et al.*, (1997), suggested that the creation of community organizations worked better in peri-urban areas.

3.5 TREATMENT OF LIVESTOCK BY FARMERS.

Pastoralists have a wealth of indigenous knowledge on diseases and their management. The knowledge, among the pastoralists is accumulated through observation and real life experiences. One of the most important elements of indigenous knowledge systems and practises is in the human and animal health care (ethno-veterinary practices). There are many different traditional healing practises designed to cure, control or prevent human or livestock diseases (Mcorckle and Matthias, 1992; Munyua, Mbai, Karioki, and Chibeu, 1998). Ethno-veterinary practices are more pronounced among the pastoralists who have limited choices and access to conventional Animal Health Service Delivery. Results of a study conducted on the ethnoveterinary knowledge of the Maasai of Kenya show that the pastoralists rely not only on symptoms of diseases but also on vectors of diseases, season effects and species affected by a particular malady (Munyua *et al.*, 1998; Miaron, 2002).

3.6 TRAINING OF LIVESTOCK FARMERS.

The pastoralists lose a lot of livestock due to mainly vector-borne infections which would be under control if appropriate knowledge is authentically delivered to them

through training (Ongom, 2001). The training could take advantage of the existing pastoralists' indigenous knowledge on diseases and their management.

Training of pastoralists on improved animal husbandry practice has been reported to have a positive impact in livestock production. The 'happy cow project' done among the Karimojong community of Uganda proved to equip livestock owners with the appropriate knowledge, with trained members of the community continuing to be exemplary teachers to their neighbours, and hence the amplifier effect to surrounding communities (Ongom, 2001). The happy cow project was built on the principal that trained farmers who practiced sustainable vector and helminth control would have health livestock, increased production and productivity, and hence improved livelihood of the people.

In Chad, inclusion of the pastoral communities in planning and implementing vaccination campaigns has been reported to increase their awareness that vaccinations are for their own benefits (Schelling, Wyss, Béchir, Moto and Zinsstag, 2001).

Surveillance has been a key success in disease control and eradication. Effective surveillance is essential to ensure the appropriateness and timeliness of interventions, whether they are movement control, treatment, vaccination or stamping out. For diseases that are of popular concern, participatory disease search is a sensitive method that has been employed as part of active surveillance. Pastoralists, who have the capacity to readily recognise major disease problems present in their

area have been trained and have successfully participated in related programmes. In apparently disease free areas, participatory disease searches have been used to confirm the absence of disease. Information gained through participatory disease searches on husbandry systems, grazing patterns and trade practices can be used to establish epidemiological risk levels for different disease introduction scenarios.

4.0 OIE GUIDELINES ON THE EVALUATION OF THE PERFORMANCE OF VETERINARY SERVICES (PVS)

Evaluation of veterinary services is an important element in the risk analysis process which countries use in their policy formulations directly applying to animal health and sanitary controls of international trade in animals, animal-derived products, animal genetic materials and animal feed stuffs (OIE, 2009). Whether the purpose of evaluation is to assist a national authority in the decision-making process regarding priorities to be given to its own veterinary services, or to assist the process of risk analysis in international trade in animals and animal-derived products to which official sanitary and/or zoo sanitary controls apply, in both situations, the evaluation should demonstrate that the veterinary services have the capability for effective control of the sanitary and zoo sanitary status of animals and animal-products.

The performance of animal health delivery systems can be classified using a number of indicators including resource adequacy, management capability, legislative and administrative infrastructures, independence in the exercise of official functions and performance history including disease reporting (OIE, 2009), the role of the different

players (for example, service providers who are directly in touch with farmers) and sectors (public versus private), the policy environment characteristics of the product passing through the system and characteristics of the end-user.

In the present study the performance of animal health delivery systems in the selected areas of Turkana and West Pokot districts of Kenya was evaluated to identify constraints and opportunities for improvement. There was an identified need to determine what there is and what is really required to meet the needs of the communities in ASALs as communities in pastoral areas need to be internalized in the Kenya social and economic system. Creation of sustainable Animal Health delivery systems in the ASALs, which are purposefully designed to supply the quality and quantity of livestock services as required by the pastoralists will be the most cost-effective and sure way of alleviating poverty in these areas. The results were to better inform the policy makers and project programme implementers when allocating resources.

CHAPTER THREE

DESCRIPTION OF THE STUDY AREA

3.1 OVERVIEW OF THE STUDY AREA

This chapter describes the study area, including the major human and physical geographic characteristics of the target districts in the northern part of the Rift Valley Province and the communities. It provides details of the administrative divisions, altitude and climate, population density, livelihoods, village characteristics and compound mapping, livestock production, land use, and delivery of veterinary services.

The study was conducted in West Pokot and Turkana Districts, which are part of the thirty five (35) districts that form the Rift Valley province of Kenya. The other districts are: Transmara, Uasin Gishu North and South, Marakwet, Baringo, Bomet, Buret, Kajiado, Keiyo, Kericho, Kipkelion, Koibatek, Laikipia East, North and West, Loitokitok, Molo, Naivasha, Nakuru North and South, Nandi North and South, Narok North and South, Samburu East and North, Sotic, Transzoia East and West, and Wareng. The area, which borders Uganda, Sudan and Ethiopia, is occupied by pastoral, agro-pastoral and sedentary Pokot and Turkana communities. The area has a harsh climate that has been compounded by years of administrative neglect and poor development. Cattle rustling, which takes place during the day and is often

associated with massacres, is commonly triggered by competition over declining water and pasture resources and subsequent counter-raids. Occasionally the pastoralists turn on their sedentary and agro-pastoralist neighbours with disastrous outcomes. Such incidences often assume a political dimension with all manner of politicians being dragged into the fray. Unfortunately, the raids occasionally result in massacres and massive displacement of populations as livestock are driven away. (Hassan, 1997).

3.2 ECONOMIC AND DEVELOPMENT CONSTRAINTS IN THE NORTH RIFT VALLEY PROVINCE

The economy and development in the North Rift Valley province has over the past several decades, and still is, constrained by several factors including natural, human, technological, political and socio-economic factors which are described briefly here below:

(i) Constraints related to physical environment

The rural populations in West Pokot and Turkana depend heavily on natural resources, through cultivation, herding, energy source (fire wood or charcoal) collecting or hunting for their livelihoods. The level of the dependence is such that for the livelihoods to be sustainable, the natural resources must be sustainably utilized (Dasgupta, 2003). In West Pokot, Turkana and other areas with similar environment the factors that give rise to rural poverty are also at the root of the degradation of

natural resources; and degradation of the natural resources strikes at the heart of the ability of the poor to develop sustainable livelihoods (Dasgupta, 2003).

Recurrent droughts, which only served to increase the hardships, have always been a major risk for the livestock-dependent agro- pastoralists and pastoralists. Against this challenging background of climate change, are resilience levels of conflict and misplaced government policies that are in favour of unsustainable crop production and fail to support more sustainable systems such as extensive pastoralism (Irungu *et al.*, 2006).

(ii) Inadequate infrastructure

Poor and/or inadequate infrastructure including roads, water, electricity and telecommunication, has left the ASALs in Kenya isolated, inaccessible and remote (Omiti and Irungu, 2002). In particular, the expansiveness of Turkana and West Pokot districts and poor road network makes it difficult for transportation of people and their goods. The poor infrastructure also discourages the emergence and development of efficient livelihood systems as a result of high transaction costs (Omiti *et al.*, 2002).

(iii) Financing (credit and savings)

Often, agricultural credit in Kenya is mainly and disproportionately channelled to arable crop production where it is assumed to be most needed and perceived to provide relatively higher returns. Because pastoralism is practised under risky and uncertain socio-economic and climatic conditions, it is assumed that is not stable enough to provide a relatively high return on credit. This later view has led to the

discrimination of pastoralists in terms of access to credit (Omiti *et al.*, 2002). This is a constraint that needs priority attention in micro-policy in the rural sector of any developing country, if the poor development history is to be reversed.

(iv) Enabling environment for community initiatives

In the target districts, as all other pastoral areas, an environment that facilitates small-scale enterprise is not yet to take hold. Employment opportunities especially for the youth are few and far in between, and until the advent of the CDF (2003) low levels of development funds meant that the chronically poor had to depend on relief food (World Bank, 1996).

(v) Institutional failure

Like in any other rural economies in the developing world, market imperfections in the North Rift are wide spread. The imperfections range between missing markets, thin markets, rationing inter-linkages of markets, and the presence of other institutional arrangements that replace markets. In Kenya as a whole, sustainable livestock production in pastoral areas is made worse by the failure of institutions to guard against both poor governance and the articulation of development policies that are biased against pastoralism (Omiti *et al.*, 2002).

Institutional failure in these areas is depicted by, among other factors, social and political marginalization, economic stagnation, destitution and persistent social conflicts (Omiti *et al.*, 2002). Of particular importance to Turkana and West Pokot

Districts are the functioning of labor markets, land markets and land tenure system, credit markets, and input and output markets.

(vi) Conflicts and poverty

Conflicts undermine pastoral development while increased insecurity hinders the free movement of productive resources such as labour and capital thereby restricting investments (Omiti *et al.*, 2002). Conflicts increase transaction costs, which minimize the incentives for the private sector to participate in the pastoral economy in addition to reducing access to water and pasture. Insecurity also creates fears about the movement of the livestock and people, thereby restricting their herding activities (Omiti, Otieno, Nyanamba and McCollough, 2009). Moreover, conflicts reinforce the negative impacts of other shocks such as drought and epidemics, rendering them more difficult to control. For instance, it has been noted that the horn of Africa still remains a major reservoir of such diseases such as Rinderpest, RVF, CBPP, PPR and FMD because conflicts preclude effective implementation of vaccination campaigns). Moreover, livestock raiding between neighboring communities and countries enables unvaccinated herds to move back and forth, thus increasing the risk of the spread of trans-border diseases (Omiti *et al.*, 2002). Conflicts are also highly detrimental to the development process, because the level of destruction in such conflicts can be very high. Moreover, the conditions of under-development that conflicts spawn in the long run often result in more death and suffering from disease, hunger, and low food consumption than the actual fighting (Omiti *et al.*, 2002).

The cause of conflicts in the North Rift Valley region include the high premium placed on livestock and livestock products, continuation of traditional practices such as cattle

rustling, expansion of agricultural land, commercialization of cattle rustling, episodic drought and insecurity. The protracted conflict and insecurity in the pastoral areas of the North Rift Valley province contribute to the widening of the poverty gap between pastoral groups and the rest of the country. Economically, conflicts and insecurity prevent investments and hamper development programs. Due to the current levels of insecurity in the region, no viable economic activity or empowerment can thrive (Hassan, 1997).

Politically, conflicts and insecurity contribute, through media portrayals, to widespread public images and stereotypes of pastoralists as congenitally backward, irrational and violent. This brings about tension in the society, especially based on increasingly stereotyped images of the pastoralists and reluctance of professionals to be posted to pastoral areas to provide services (Hassan, 1997).

3.3 TURKANA DISTRICT

3.3.1 Location and geography

Turkana district is an administrative district in the rift valley province of Kenya, which is part of Kenya's ASALs. It is the largest of the 35 districts of the Rift valley province, and it is situated in the northwest Kenya to the west of Lake Turkana. It borders Marsabit and Samburu Districts in the east, Baringo District in the south and West Pokot District in the south. It shares international boundaries with Ethiopia and Sudan

to the north, and Uganda to the west. Figure 1 shows the map of Kenya indicating the international boundaries shared by Turkana District.

Turkana is the largest, yet least developed district in the country. This lack of development can be partly explained by Turkana's harsh climatic conditions (Watson and Van, 2008).

3.3.2 Administrative divisions

The district is divided into 3 constituencies (Turkana north, central and south), and 17 administrative divisions i.e. kibich, Lapur, Kaaling, Lokichoggio, Kakuma, Oropoi, Kalokol, Central Turkana, Kerio, Turkwel, Loima, Lokichar, Katilu, Lokori, Kainuk, Lomelo, and Lokitaung. These are further divided into 58 locations, 156 sub-locations. Of interest in the study were Lokori and Central divisions. Figure 2 shows Turkana district livelihood zones and administrative divisions.

3.3.3 Altitude and climate

Turkana District lies between 34°0' and 36°40' East and between latitudes 0°54' and 5°30' North. It is the largest district in Kenya and covers 77,000 square kilometres (Republic of Kenya, 2002a). There are several mountain ranges in the district such as Loima, Lorengipi, Lokwamoru, mogilla, Lorianotoma, among others. The altitude of the mountains ranges between 1500 and 1800m above sea level in the east reaching the peak at Loima, which forms undulating hills for an area of some 65 square kilometres.

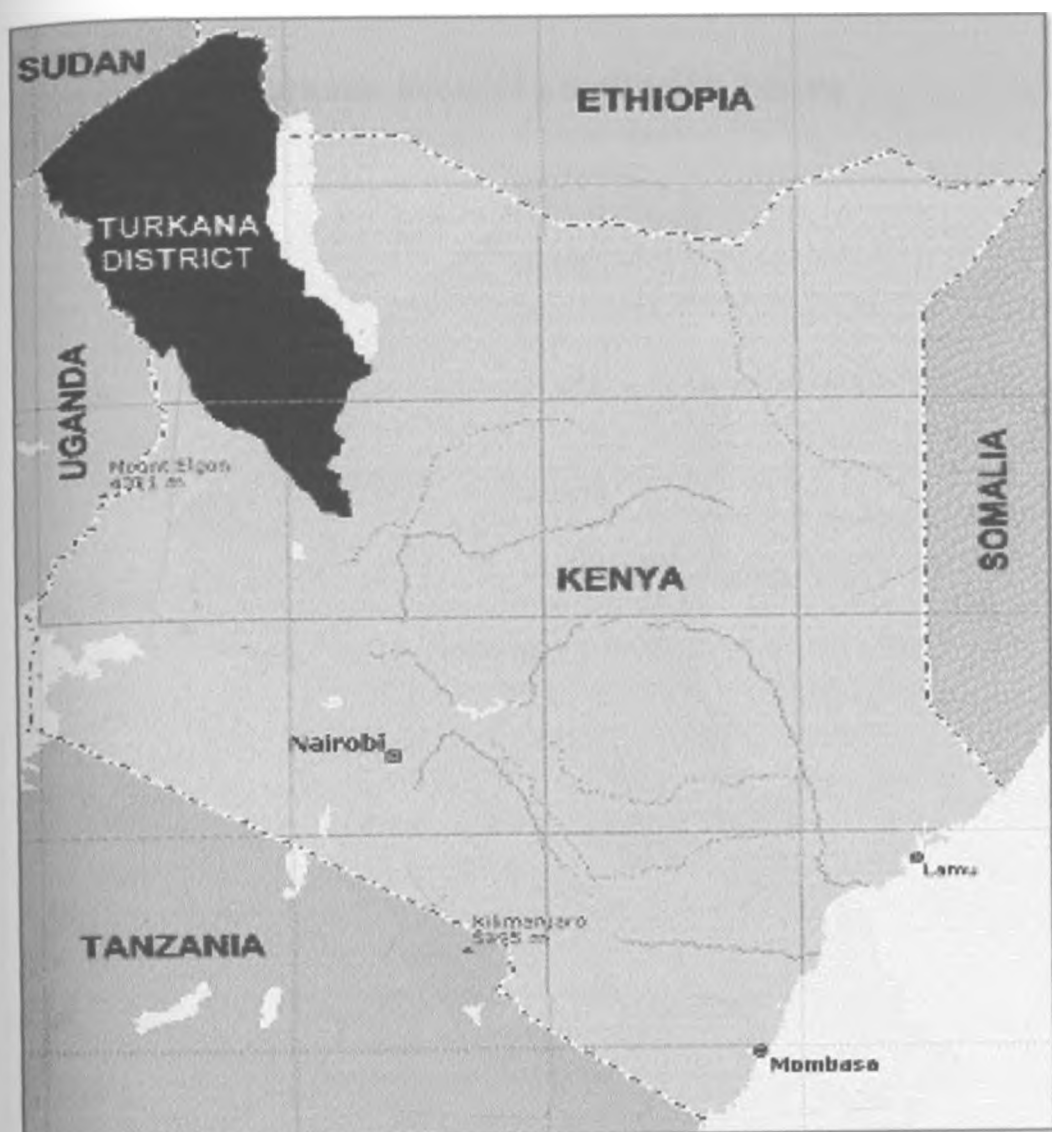


Figure 1: The location of Turkana district

Turkana District Livelihood Zones

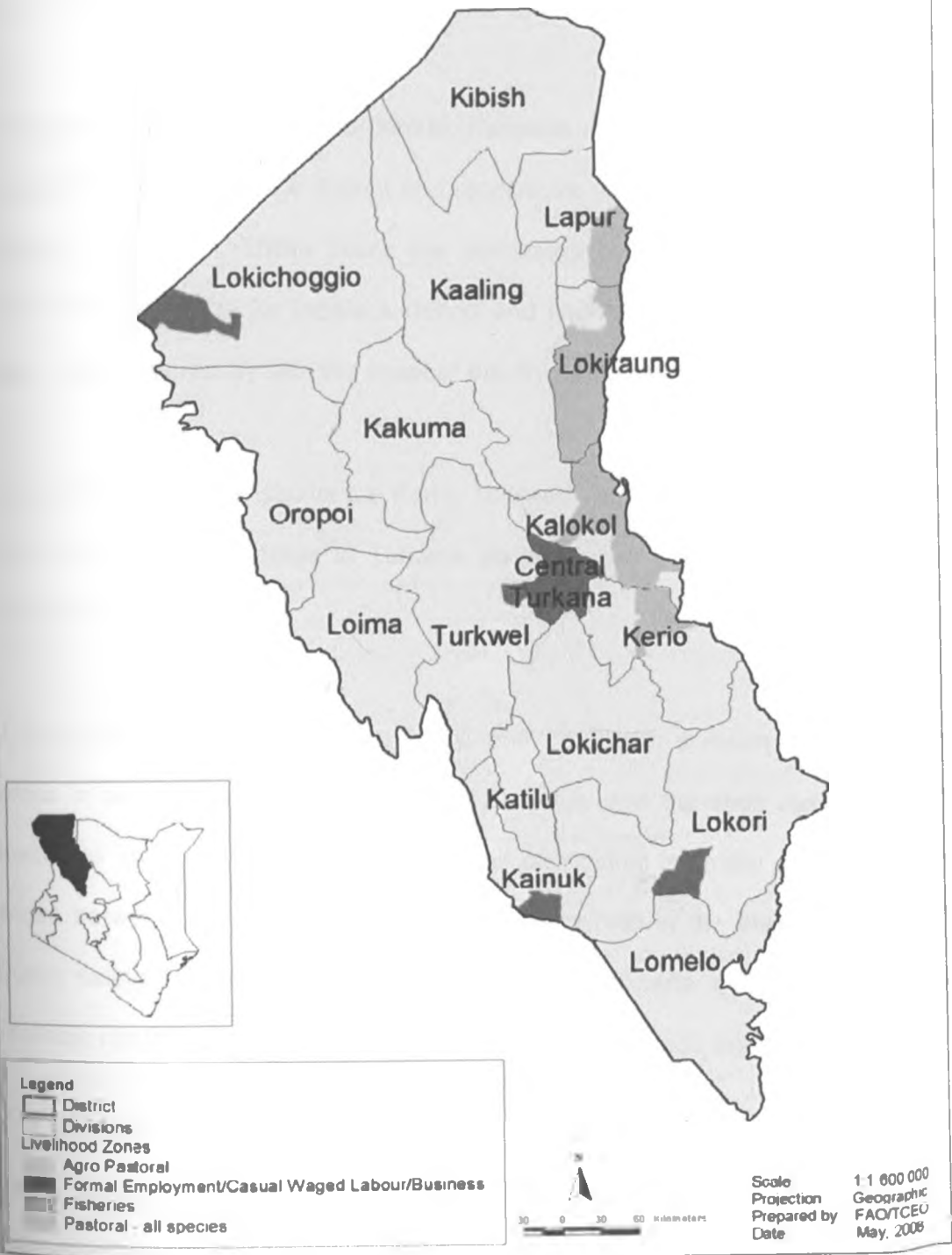


Figure 2: Turkana District livelihood zones and administrative divisions.

The ranges support important economic activities like honey production, grazing during the dry season, water catchment sources, gum Arabica harvesting, small shambas and wood production (Gakure, Mbogo and Ochieng, 2006).

The open plain consists of the central, Kalapata and Lotipi plains. The plains form part of the arid area in the district and receive the lowest amount of rainfall, around 180mm per annum. These plains are dominated by dwarf shrubs and grassland, which provide forage for livestock during and shortly after rainy season. However, this forage dries rapidly with the onset of the dry season (Gakure *et al.*, 2006).

The major rivers in the district are Kerio, Turkwel, Tarah and Suguta. As these rivers get to the low laying areas in Turkana districts, they disappear under the sandy riverbeds.

The temperature ranges between 24° C and 38°C with a mean of 30°C. Rainfall comes in two seasons, the long rains in April-July and the short rains in October-November. However, the rainfall pattern and distribution is erratic and unreliable. It ranges between 120 mm to 500mm. Average rainfall in the plains is about 300-400mm falling to less than 150mm in the arid central parts. Due to the erratic and unreliable rainfall, famine is a constant threat (Gakure, Mbogo and Ochieng, 2006).

3.3.4. Population density

The 1999 National census population of Turkana district estimated the human population to be 450, 860. Of the total estimated population in 1999, 224,548 were male while 226,312 were female, giving a sex ratio of male/female 92:100. Seventy

percent (70 %) of this population is nomads and therefore population concentration in the district is always determined by rainfall, water and browse. The population density varies from 29 persons per km² in Kakuma division to 1 person per km² in Kibish division. Many deaths occur due to raids and drought (which leads to famine lack of water and pasture for the livestock (Gakure *et al.*, 2006).

3.3.5 Village characteristics

3.3.5.1. Livelihoods

Just like for any other people living in the developing world, the livelihoods of the Turkanas are complex, and are based around a wide range of activities. Most households base their livelihoods around complex strategies that seek to maximise the use of the bundle of resources accessible to them. Livelihoods in the district are also influenced by a wide range of external forces, both within and outside the locality in which the household lives, that are beyond the control of the family. This includes the social, economic, political, legal, environmental and institutional dynamics of the local area, the wider region, the country and, increasingly, the world as a whole (John, Piers, Oliver and Matthew, 2009).

(i) Livestock production

Rainfall, being unreliable and highly erratic, runs rapidly off the barren soils and causes flash floods in the rivers and valleys. The District has a very low agricultural potential and is only suitable for extensive rearing of indigenous livestock. Livestock production, being the main economic activity in the district, accounts for 93.2% of

most household incomes and 95% of most households' employment. The main types of livestock reared include goats, sheep, cattle, camels and donkeys, which provides such products as hides, skins, milk, meat and ghee. The highest numbers of livestock in Turkana are to be found in Lokitaung and Lokori divisions with the heaviest average concentrations being evident around the catchment areas of Kakuma, Kalokol, Lokori and Lorugum (location), but low around Lodwar and Katilu. The 1999 livestock estimates are shown in table 1.

(ii) Agricultural activities

Only about 30% of the district's soil can be rated as moderately suitable for agriculture production due to the high rate of evaporation. People have settled permanently and semi-permanently along the Turkwel and Kerio rivers, where irrigated farming is practised (Gakure *et al.*, 2006).

Table 1: Estimated livestock population in Turkana District

Livestock	Numbers	Percentage
Goats	1,951,200	59.0
Sheep	975,600	29.5
Cattle	193,600	5.8
Camels	140,760	4.2
Donkeys	32,640	1.0
Poultry	10,387	0.3
Pigs	30	0.2
Total	3,304,217	100

Source: ILRI 2009

Only a small farm sector exists in the district. Average farm holdings are 0.1 to 0.5 hectares. Crops like maize are grown as staple food whereas cotton is grown as a cash crop in some parts of Katilu and Lokoloi divisions. The main agricultural activities are confined to small irrigation schemes found in several areas in the district. The food crops produced are consumed by local communities, hence there is little surplus for sale. Sorghum is the major income source, followed by maize and cowpeas respectively. Cotton production generally ceased with the collapse of the sector in Kenya (Gakure *et al.*, 2006).

(iii) Mining

The district has rich building sand and quarry stones. Small scale gold mining is found in the southern part of the district at Nakwamoru and central parts of Makutano near Kakuma. The gold mining is not of commercial nature, though an alluvial type of it is being exploited. Oil prospecting is also going on (Gakure *et al.*, 2006).

(iv) Fishing

Lake Turkana is a source of a variety of fish, mostly used for supplementary food but not as a sole means of livelihood except for small population around Kalokol market. There used to be a flourishing fish industry at Kalokol which collapsed in the 1980s due to mismanagement (Francis, Pauline and Frank, 2009).

3.3.5.2 Infrastructure

(i) Roads, air and water transport

There is only one class A all weather road from Kainuk to Lokichogio, covering a distance of 438 km and another class B road running from Lodwar to Kalokol and

covering a distance of 60 km. There are two class C roads, one of which runs from Lokichar to Lokori (a distance of 68 km) while the other runs from Lokori to Kapendo (134 km). Both are earth roads and are impassable during the rainy seasons (Gakure *et al.*, 2006).

(ii) Communication

In regard to communication, there are five post offices and six sub-post offices in the district. The head office in Lodwar has an exchange system. There are also private providers (Safaricom and Telkom) communication network systems in the district (personal communication, 2004).

3.3.5.3 *Land use information*

By the time of the study, land was communally owned and was mainly used for free range livestock production and minimum crop farming. There was land shortage attributed to: Increase in human population; land fragmentation in some areas; immigration of farmers; increased livestock population and land degradation partly due to overstocking. Land shortage was experienced for both cropping and grazing and was experienced throughout the year. It led to food shortage, low income, conflicts with other resource users, and loss of livestock and crop (personal communication, 2004).

3.4 WEST POKOT DISTRICT

3.4.1 Location and Geography

The Pokot live in an ecologically complex region that extends from the plains of eastern Uganda across the highlands of north western Kenya to the plains of lake Baringo. It is situated alongside the Uganda border, West Pokot abuts the districts of Turkana to the north and the east, Baringo and Elgeyo Marakwet to the south east, and Trans nzoia to the southwest. The cool rugged highlands that form part of the western wall of the Rift Valley run through the center of the district, separating the dry, hot plains.

3.4.2 Administrative divisions

Figure 3 shows West Pokot administrative boundaries. The district comprises three constituencies, Kacheliba, Kapenguria and Sigor. It comprises ten administrative divisions namely: Kapenguria, Lelan, Kacheliba, Kasei, Chepararia, Alale, Sigor, Chesegon, Sigor, Tapach and Kongelai sook. It covers an area of 9,100 km² and borders Uganda to the west, Baringo district to the East, Trans-nzoia and Marakwet districts to the south and Turkana south district to the north and northeast. The livelihoods in West and Central Pokot are mixed farming, agro-pastoralism and pastoral (Wycliffe, Mbolu and Mbiuki, 2009). In total, there are 36 locations and 112 sub locations in the districts. Of interest in this study were Kacheliba, Kapenguria and Alale divisions (GOK 2005).

3.4.3 Altitude and climate

The Kenya's Pokot districts are a pestle-shaped administrative unit of approximately 9,135 square kilometres stretching from 1°07' N to 2°40' N and from 34°37' E to 35°49' E. The districts are very varied topographically. The south-east section being part of Cherengani hills have ranges with altitudes higher than 3000 metres above the sea level. Other highlands include the sekerr mountains, and the Chemerongit. These too range-rise to over 3,000 meters. Along the border to Uganda the altitude drops down to 1200m. Going north and north- east, the country gradually drops and stretches towards the dry and hot plains of Turkana at less than 900 metres above the sea level.

West Pokot District Livelihood Zones

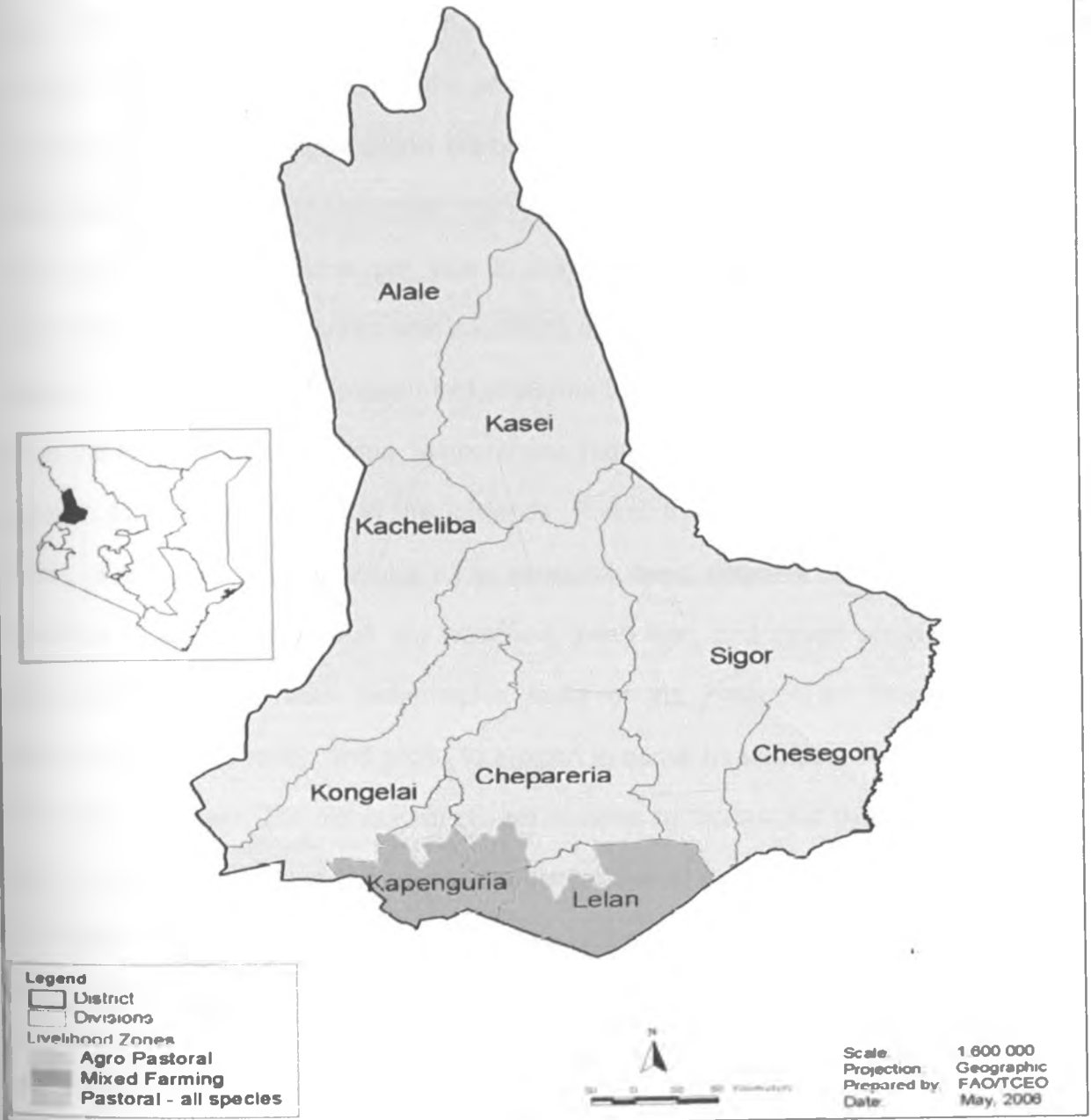


Figure 3 : West Pokot District livelihood zones and administrative boundaries.

Source : Food and Agriculture organization of the United Nations (FAO)

The western plains vary from 1,200 to 1,800 meters. Four perennial rivers, all of which feed Lake Turkana, flow northward through the district: the Suam/Turkwel, the Kerio, the Weiwei, and the Morun (GOK, 2005). Rainfall received is bimodal, with the long rains between March and July: the peak of the rains is normally between April and May, and livelihoods in the district are dependent on these rains. The short rains come between October and December mainly benefiting pastoralists. Rainfall varies from less than 40 centimetres per year in the lowland areas to more than 150 centimetres in the highland areas, with deviations of up to 40% from these long-term averages. Normal total precipitation is 1,600 mm in the highlands and about 700 mm in the lowlands. Mean annual temperatures range from less than 10°C in the highlands to more than 30°C in the lowlands. Rivers traversing the districts are Weiwei, Suam and Muruny among other seasonal ones. (Wycliffe *et al.*, 2008). Vegetation includes moist forest, dry woodland, bush land, and desert scrub. The soils, derived primarily from metamorphic rocks of the Precambrian Basement System, are shallow, rocky, and prone to erosion in some areas; deep, fertile, and well drained in others. The highland areas are covered by forests, but deforestation owing to population pressure out spaces the designation of forest reserves. In order to increase forest cover, which is critical to water retention, the government operates a number of tree nurseries in the district.

3.4.4 Population Density

The 2008 population for the three districts is 499,657 people (Wycliffe, Mbolu, and Mbiuki, 2009). Cheperaria has a relatively higher population concentration followed by Kapenguria and Sigor (Government of Kenya, West Pokot district development

plan 1997-2001). The average population density is 34 people per square kilometre (GOK, 2005).

3.4.5 Village Characteristics

3.4.5.1 Livelihoods

The Pokot districts have three major livelihood zones namely, pastoral, agro-pastoral and mixed farming. The pastoral livelihood zone covers the lowland divisions of Alale, Kasei and Kacheliba, and parts of Chesegeon division, parts of Sigor division, parts of Chepareria division, and parts of Kongelai and these were the divisions included in the study. Compared to other districts in Kenya, development in west Pokot district started late. This is manifested in the low rate of economic development, education, health, agriculture and industry. The district is rich in resources such as honey, but these still remain largely unexploited (Lenemiria, Mutavi and Ochieng, 2005).

(i) Livestock production

West Pokot district is 75% ASAL and is predominantly pastoralist. The livestock reared consist of cattle (Zebu), camels, donkeys, sheep and goats. The main pastoralist divisions are Alale, Kacheliba, Sigor and parts of Chapereria. Dairy cattle are reared in Lelan, the upper part of Chepareria and in Kapenguria. Thus, livestock keeping is the most viable way of utilizing the vast rangelands of the district and accounts for a significant percentage of household incomes in the district (94.7%). The 2000 livestock estimates are shown in table 2.

(ii) Agricultural activities

Land is mainly communally owned except small portions, which are individually registered particularly within the agriculturally rich divisions of Kapenguria and Lelan. Maize, Sorghum, beans, finger millet, Irish potatoes, cassava, horticultural crops and green grams are among the food crops grown in the district. Cash crops include coffee, pyrethrum and sunflower. The first three are grown on a relatively small scale while sunflower is the third most important crop after maize and sorghum (Gakure *et al.*, 2006.)

Table 2: The 2002 livestock population estimates in West Pokot District

<i>Livestock</i>	<i>Numbers</i>	<i>Percentage</i>
Sheep	310,000	36.7
Goats	277,000	32.8
Cattle	250,000	29.6
Donkeys	5928	0.7
Camels	1669	0.2
TOTAL	844,598	100

Source: Livestock Census (2000).

(iii) Mining

Other resources found in the district included minerals such as gold, copper and chromium, which are however, not found in commercially viable quantities. These accounted for only 0.26% of the total household monthly income (West Pokot district Vision and Strategy, 2005).

3.4.5.2 *Infrastructure*

The district has poorly developed infrastructural facilities except the Kitale Lodwar road, which cuts through Kapenguria and Chepareria divisions. Other roads such as the Makutano-Konyao-Alale are in pathetic state despite being a major link between the northern part and the rest of the district (West Pokot district Vision and Strategy, 2005).

3.4.5.3 *Basic social Infrastructure*

(i) Communication networks

Telephone services distribution is not well developed and except for privatised telephone services (Safaricom and Telkom), there are two districts without telephone connections.

(ii) Education

In most parts of Kenya, and particularly in the North Eastern Province and districts such as Turkana and West Pokot, children are at risk of missing out on educational opportunities in times of stress. In these areas, enrolment rates are already low and gender disparities stark. Educational facilities are not adequate and parents are unlikely to leave their children to continue schooling as they migrate and tend to pull out children to take up other chores such as herding and fetching water (Kenya food security steering group, 2005).

CHAPTER FOUR

METHODOLOGY - DATA COLLECTION AND ANALYSIS

4.1 OVERVIEW

This chapter describes data collection instruments and data analysis procedures used. The following activities were undertaken to accomplish the task,

(i) research design, (ii) questionnaires preparation and pre-testing, (iii) field surveys, (iv) information collection and processing and (iv) data cleansing and analysis, and discussion. The socio-economic data were used to draw up a 'check list' for a number of variables which were used to determine factors influencing pastoral household livestock incomes in the two districts. Descriptive and regression analyses were carried out for the data collected from the questionnaires. Transformations and conversions of the data were done for more in-depth analysis.

The study was based on primary data that was enriched with secondary data and information. A draft questionnaire was developed in line with household data collection for socio-economic research in Agriculture (Nyariki, 2009). The draft questionnaire constructed taking into account the objectives and the hypothesis of the research was pre-tested before setting out to the field. While designing the questionnaire, which was both, dichotomous and multiple-choice, it was ensured that each questionnaire was simple and phrased in a manner that would imply the same meaning to all that were to be interviewed. In addition the questionnaires were crafted in such a manner that they had few short and precise questions, which were

pertinent to the objective of the study. Any questions that carried more than one meaning, ambiguous or leading questions were avoided. All these precautions were undertaken to avoid tiring and/or boring respondents from answering an unending list of questions, which may also have led to incorrect answers (Hoinville and Jowell, 1978).

4.2 SOURCES OF DATA

Initial reconnaissance survey of the two Districts was conducted to gain some basic understanding of the area for selection of sampling sites and to introduce the study to the residents of the area. The pre-study familiarization with both the physical and socio-cultural landscape was also crucial in the formulation of the study approach and methods.

4.2.1 Primary information

Primary (raw) data were collected through questionnaire interviews, focus group discussions (FGDs) and other participatory methods.

4.2.1.1 Design of questionnaire

Questionnaires were designed in line with the World Organization for animal Health (OIE) recommended evaluation of veterinary services delivery systems. A sample questionnaire is attached in Appendix I. Questionnaires were developed, pre-tested on selected households in the study area and adjusted as appropriate to avoid more than one meaning, ambiguity or repetition.

Different questionnaires were used for the herders and the various cadres of Animal Health Service deliverers. In each of the two districts, a total of 80 households were selected. Data were collected on household size and characteristics, number of livestock owned, sources of income, access to markets and roads, access to water, access to veterinary and extension services, and affordability of the services.

4.2.1.2 *Training of interviewers and testing of questionnaires*

The identification and training of enumerators from the local community was carried out before the actual fieldwork was undertaken. This was necessary given the language barrier and to provide assistance to speed up the process of data collection. The rapporteurs were trained for three days to ensure that they did not deviate from the required protocol, thereby reducing bias in the sample data collected. They were taken through a training entailing the following: familiarity with the research topic; objectives and expected outputs; the critical role of *rapporteur* in the research process; methods of data collection; and developing a coding system for the analysis alongside verbal response to each question. The *rapporteurs* were also given lessons on the following:

- Who to interview
- How large a group to interview
- Where to interview
- How to order questions

- How to phrase questions
- How to listen
- What to observe for during an interview.

There was role-playing where the questionnaire enumerators simulated the household interview. After training, a draft survey was run with a sample of the target population. Ten households were used in the test-run. During the pre-testing, the following objectives were met:

- Testing of the questionnaire to make sure that the process was working and that desired information was obtained. Questions from which desired information was not obtained were adjusted.
- Evaluation of the rapporteurs to make sure that they were achieving the desired objectives

The questionnaire was pre-tested on ten households before it was administered on the main sample. After the initial field experiences and questionnaire-testing exercise, the questionnaire was revised to make it more relevant and effective in gathering the required information.

4.2.2 Selection of study units and sampling

4.2.2.1 Selection of divisions and households

Because of the inherent difficulties in accessing most parts of the study area, chief of them insecurity, poor terrain, and scattered homesteads, simple random sampling data collection technique proved difficult. Stratified random sampling procedure was

therefore used to collect the socio-economic data. The goal of stratified sampling is to achieve desired representation from various subgroups in the population (Mugenda and Mugenda, 1999). The method involves dividing the population into two or more subpopulations using given criteria, and then a simple random sample is taken from each subpopulation. The reasons for sampling populations in this manner include i) to make statements about each of the subpopulations separately and ii) to increase the precision of the estimates over the entire population.

Two sample populations (divisions) were purposely selected in each district to reduce the area covered because of the expansive nature of the districts. These divisions were chosen as sample populations because they had the highest numbers of livestock. The sample was then used to generalize about the population. Selection of the primary sampling units (PSUs)-the divisions, was followed by the selection of address units in sample PSUs (the households) and finally the determination of households and people to be included in the study. For the purposes of the study, the household was defined in terms of people considered resident in the districts, or family compound and included not only people currently living there, but also household members living elsewhere.

Since drawing of the sampling frame was done based on administrative boundaries, reconnaissance surveys and literature reviews were carried out to avoid dealing with agro-ecological zones that traverse the boundaries. Thus before sampling, the researcher familiarized herself with the area and population of interest.

A list of all divisions in each of the districts was obtained from the provincial administration. Then two divisions in each district that had the highest cattle population were purposively selected. A list of households in each selected division was obtained through the assistance of the local administration (village headmen, chiefs, and some other local leaders) from which a sample frame (an ordered list of individuals in the target population) was drawn. Random sampling was done in which the selection of the sample was made using deliberate, unbiased process, so that each sampling unit in a group had an equal probability of being selected (Levy and Lameshow, 1996). The use of random numbers was applied in which Random numbers were generated using the computer. Basically, sample size was calculated according to the method described by Lwanga and Lemeshow (1996), and was made as representative as possible of the target population. For the sample to be truly reflective of the characteristics of the target population, random allocation was done such that every member of the population had an equal chance of appearing in the sample. According to this method, sample sizes depended on the number of households in each division. Sample size was determined, taking care to ensure that the samples were not so large as to reduce the resources available per unit and to compromise the quality of the data collected. However, considering the logistics and security issues in the study area, and after assessing and taking into account relative difficulties of accessing the study area due to the nature of the terrain and the level of development of the infrastructure, In each of these divisions, a sample size of 40 households, which is large enough and is acceptable in social studies was considered, making a total of 80 households per District (Freund and Benjamin, 2006).

4.2.3

Selection of animal health service providers (Veterinarians, paraveterinarians and CAHWs)

In each district, a list of all animal health service providers was obtained from the district veterinary officer (DVO). The census method was used in which all veterinarians and animal health assistants were selected, whereas a total of 40 communities based animal health workers in the two districts was selected.

4.2.4 Actual data collection and data entry

Planning of fieldwork was carried out in collaboration with the District Veterinary Officer (DVO) in each district. The DVOs were provided with the lists of selected households in their districts which they used to contact the herder and arrange for the household interviews. Thereafter, they accompanied the team during household visits, introducing team members to the herders and helping the team to establish a rapport with interviewees.

The trained questionnaire enumerators for the study had good knowledge of English and the local languages (Pokot and Turkana), and had been hired from the department of veterinary services. As the questionnaires were designed in English, the enumerators had to ask questions to the respondents in the local language and record them in English ensuring that the interpretations remained the same throughout the study. Each household was visited individually. Each enumerator was expected to visit an average of three (3) households per day. The researcher also carried out 1-3 interviews in addition to enumerator supervision either accompanying

them during the interviews or paying random checks. Additionally, the researcher went through filed-out questionnaires to verify collected information, pointing out any that needed repeat household visit. As a traditional token of good will gesture during the visit, Kat, and tobacco were given to each of the selected household heads. These customary gifts were of minimal value but demonstrated respect. They acted as very good 'icebreakers'. Since local preferences for Tobacco and Kat are quite specific, stocks were obtained in local market towns to be sure that the right and most desirable quality of each commodity was offered.

The data was collected using the method described by Mulwa and Nguluu (2003). Briefly this entailed:

- i. A list of organizations promoting animal health care in each location as well as households keeping livestock was compiled.
- ii. The animal health care interventions in each location were identified and described as well. In order to avoid selection bias, as many as possible stakeholders were consulted. A total of 160 households were interviewed.
- iii. Gender, age and socio-economic standing were factors to be considered.
- iv. The most important variables in pastoral household livestock income considered were gender and level of education of the household head, age of household head, household size, animal health service provider density, herd size, distances to the nearest roads and markets, time taken by the animal health service providers to respond to the herder call, accessibility and

acceptability of available services, availability of animal health services and related transaction costs, and availability of extension services.

- v. Livelihood criteria was also considered to filter participants i.e. cattle owners vs. small stock owners. In this manner, the view points of the different socio economic strata were represented. Participatory techniques, including semi structured interviews were used to gather primary data from these groups of stakeholders.

4.2.4.1 *Field surveys*

(i) **Rapid Rural Appraisals (RRA)**

A Rapid Rural Appraisal (RRA) was a preliminary survey procedure conducted prior to the commencement of data collection. The researcher engaged in dialogue with herders to identify and analyze a range of issues affecting their livelihoods. Different types of livestock keepers were characterized and the main policy and institutional constraints the herders faced were identified and this formed important steps towards identifying issues to be addressed in the study. The appraisals involved walking and driving through the survey area to observe the animals, meeting with elders, interviews with key informants and group interviews (Mulwa and Nguluu, 2003). From the RRA, factors identified that affected pastoral household incomes included, herd size, house hold size, gender of household head, cost of animal health services delivery, acceptability available animal health deliverers, availability of animal health services, income levels, age of household head, service demand, mode of animal health service delivery, and time taken by the animal health service deliverer to respond to a herders call.

(ii) Pilot survey

The developed research questionnaire was pre-tested in a pilot survey involving 10 households from the target population in each district, and was adjusted appropriately before it was used in the main study. The 10 households selected for questionnaire pre-testing in each district belonged to the same area of survey but did not come from the main sample. After pre-testing the pre-field questionnaire, it was decided which questions to exclude or modify, leaving the final questionnaire with only relevant and appropriately phrased questions that were put to the interviewees from the main sample (Mulwa and Nguluu, 2003).

(iii) Field surveys

During field surveys for actual data collection, a wide range of PRA methods was employed to enable herders to express and share information and to stimulate discussion and analysis. The PRA techniques used were:

Social mapping

Social mapping is a geographical presentation of resources and services available in a community. In each of the four divisions, community members drew social maps. They also identified persons they believed were familiar with the villages to draw social maps. Small colored manila papers were used to identify the households and the key resources. The resources identified and included in the maps were roads, swamps, valleys, rivers, wells, bore holes, mountains, schools, health facilities and churches.

Wealth ranking

As a follow-up to the social mapping and identification of households, the research team discussed with the community members the various socio-economic groups. Wealth ranking involved ranking of individuals or households based on community perceptions of wealth (or lack of it). The socio-economic categories identified were the rich, poor and very poor households. A key indicator used for wealth (or lack of it) was ownership of livestock.

Seasonal calendars

In the four divisions community members drew detailed seasonal calendars indicating seasonal variations. Using a 12 months calendar, the communities identified the seasonal variations and their impact on pastoral household incomes. The important seasonal variations identified in many villages were rainfall, expenditures, incomes, diseases, food availability, and variations in livestock diseases, vectors, and livestock-wildlife interactions.

Trend analysis

Trends in the four divisions addressed the changes that had taken place in relation to the affordability of veterinary services and other essential goods and services. The underlying reasons for such variations were noted. Through this process, people were able to identify the available animal health care services that were important to them namely, self treatments, treatments by CAHWs, and treatments by veterinarians and AHAs both government and private. Other important changes

noted in many of the divisions were income levels, food, water and pasture availability and access.

Time lines

Timelines for the last 10 years in the divisions were noted from key informants. Time lines are lists of key events in the history of a community that help to identify past trends and problems facing the community, especially those that are related to pastoral household incomes. In West Pokot and Turkana Districts, the major historical events, which were closely related to pastoral household incomes, were drought and history of livestock diseases. Although many of the community members were able to remember key events in the last ten years, some of them did not always remember the actual years when specific events took place.

Matrices and disease scoring

Livestock and disease specific information was obtained using the following data collection instruments: Cross tabulated matrix scoring system that was used for local characterization of diseases according to disease signs and causes, as well as preferred disease control options; and disease scoring (pair wise ranking) that was used to prioritize livestock diseases with reasons;

Proportional piling

This was used for relative livestock ownership and food, income and other benefits.

Livestock species scoring

This was used for preferred types of livestock reared. Livestock preferred included Cattle, sheep and goats, camels, and donkeys.

Natural resource and social maps, and transects

These were used to identify resources available to rear livestock; mapping and Venn diagrams were used to determine social organizations; and natural resource and social maps were used to determine system boundary.

Pair-Wise Matrix Ranking

Pair-wise matrix ranking involved ranking of identified needs and/or problems by a community using a matrix. The process began by community members identifying the major problems in the village. These were noted down and paired. The process involved the community comparing the various problems against each other. These problems were then ranked using scores and the outcome discussed with the community to validate if these were indeed a true reflection of community – felt needs or problems. Among the problems ranked highly included diseases in both humans and livestock and droughts (Tudor and Williams, 2004).

(iv). Personal interviews

Information was collected through community surveys, key informants interviews, and household surveys with assistance from the identified and trained questionnaire enumerators. These had been recruited from the local community to circumvent language barrier, and to ensure that the information obtained was as accurate as

possible. They included two veterinarians recruited from the department of veterinary services; trained field assistants (who doubled as translators) recruited from the local community; and community leaders. The local enumerators, who were members of the villages surveyed, were useful in identifying the sample households selected.

The visits to the households were done mainly in the mornings between 6.00 am and 8.00 am before members drove the animals to grazing and watering points. The next 4 hours were spent at the watering points and resting places for elders, with the pastoralists holding informal discussions. Household visits would then be resumed at 5.00 pm and would last up to 8.00 pm before retiring for the day. Market days were reserved for observation and collection of market data from 6.00 am when market operations would begin to 3.00 pm when the transactions would reduce.

A structural (open-ended interviews and guided dialogue technique) questionnaire was used to collect household information on situation of basic social services, family structure, production, and consumption, whereas structural questionnaires were used to assess the various cadres of animal health service deliverers. The respondents were interviewed in their local languages. To avoid exhausting the enumerators leading to a loss of concentration that could reduce the quality of data collected, five interviews were conducted per day per interviewer, and were restricted to a maximum of 45 minutes to one hour per each interview. Interviews taking more than one hour were put off and a fresh appointment made with the interviewee for another day to complete the exercise.

Sequencing of questions was given paramount importance. The more sensitive questions such as those inquiring about family size, age, and property ownership appearing later in the questionnaire. These were held back until such time when the interviewer had struck a rapport with the interviewee. The special nature of questions requiring numerical responses was also recognized. Questions were constructed in a way that allowed adequate room to make considered choices, so as to avoid forcing answers. The possibility of no response was borne in mind. For example, some people may not have remembered their exact ages and as a result, facility was created to give ages in ranges. A total of 160 pastoralists, 8 veterinarians, 40 CAHWs, and 18 animal health technicians were interviewed in both districts.

Discussions with herders indicated that pastoralists were participating actively in Participatory Disease Search especially in search of Highly Pathogenic Avian Influenza (HPAI) and Rinderpest.

(v) Focus Group Discussions (FGD)

In addition to the various qualitative techniques, including in-depth interviews, observations, and narratives, the FGD method was used as an important technique for data collection (Odimegwu, 2000). Participatory epidemiology methods (Mariner and Paskin, 2000; Catley, 2005) were used to get information during the focus group discussions. A skilled moderator, with the help of predetermined guidelines, stimulated free discussions among participants on veterinary service delivery and other related issues. Participants, who were purposefully selected, were all pastoralists of the same sex, age-set, and socio-economic background. For the purposes of this study, Focus sessions involved discussions in which a number of

respondents (average of 10 in each group), talked about selected topics that contributed to the study, including seasonality of disease outbreaks and diseases prevalent in the area (Mulwa and Nguluu, 2003). To ensure adequate coverage, 10 group sessions were conducted in each division. The discussions were conducted as open conversation in which each participant was free to comment, ask questions, or respond to comments of others (Olwande, 2009). Discussions started with more general issues and slowly gravitated to more specific ones. Towards the end of the discussions, a few probing questions were asked to better reveal more in-depth information or to clarify earlier responses (Okuthe, Kuloba, Emongor, Ngotho, Bukachi, Nyamwaro, Murila and Wamwayi, 2003)

Sessions were held in a natural setting (under trees) and were conducted in a relaxed manner. There was a rapporteur, who did not at all participate in the discussions and knew the subject and the objectives of the study very well. The rapporteur was well trained in observing and noting nonverbal group dynamics, for example, facial expressions and side talks and how to record and translate the complete discussions based on his notes. The homology of the group setting and the open-end (ed) nature of the questions encouraged the participants to feel free from various constraints to which they may have been subjected during individual interviews. The moderation was well-guided and unbiased and this helped the participants to build confidence and interact. This interaction stimulated memories and feelings and in turn led to full and comprehensive discussions on veterinary delivery systems in the area and other related topics (Oruko, 1999).

From the discussions with herders and personal observations, the following was concluded:

- That livestock diseases were a constraint to pastoral livelihoods
- That animal health service delivery was not delivered in the two districts adequately by all animal health service deliverers including CAHWs.
- That CAHWs mainly sold drugs to the herders, but the herders would also purchase the same from any other available source.
- That the pastoralists were actively involved in participatory disease search with the DVS office and they actively participated in the search for Highly pathogenic Avian Influenza, Rinderpest, Rift Valley fever (RVF) and CBPP

4.2.5 Secondary information

Secondary (processed/existing) data and information were used to compliment the primary information. The secondary data used here were obtained from the Ministry of livestock. In addition, various Acts of parliament governing the establishment of veterinary practises (The veterinary surgeons Act- Cap 366), disease control (Animal disease Act-Cap 364), and supply and distribution of veterinary drugs and chemicals (Pharmacy and poisons act) were reviewed. Additional data were obtained from the code of ethics of the Kenya Veterinary Board (KVB) and from previous studies on livestock production in the ASALs of Kenya (KVAPS, 1998; Munyua *et al.*, 1998). The secondary sources of information included study reports, statistical compilations,

annual reports, journal articles, scientific proceedings, publications, and evaluation reports. Sources of secondary data and information also included various institutions and libraries both in Kenya and Japan, particularly the department of Veterinary services, the University of Nairobi and the United Nations University-Institute of Advanced Studies (UNU-IAS) Japan. Additional data were collected from the International Livestock Research Institute (ILRI). More information was sourced from the internet. Moreover, the data published in various relevant research journals, books and documents from research projects were also used to collect this secondary information.

4.3 DATA ANALYSIS

Quantitative data was expressed in terms of numbers while qualitative (categorical) data was expressed by means of description. Summary and descriptive statistics was gathered.

Data was coded to protect the identity of the respondents, entered and stored in Microsoft (MS) access, excel and statistic for storage and analysis. Statistical Package for Social Sciences (SPSS), which enables data to be stored and analyzed efficiently and quickly, was used for data manipulation and socio-economic analysis (Maddala, 2001; Stock and Watson, 2003).

Data analysis involved both descriptive statistics and regressions. Regression models were constructed for herd size, cost of delivery, household size, age of

household head, level of education of household head, gender of household head, monthly income, availability of credit, acceptability and availability of veterinary services, and service demand.

4.3.1 Descriptive analysis

Data collected was analyzed mainly for descriptive statistics. Descriptive statistics were used to provide summaries about the sample and measure. They included means, ranges, mode and variation (Sternsten, 1996). Descriptive statistics were analyzed for household income and expenditure, herd size, cost of delivery, household size, age of household head, level of education of household head, gender of household head, monthly income, availability of credit, acceptability of veterinary services, and service demand.

4.3.2 Regression analysis

4.3.2.1 Model specification

Regression models were constructed for continuous dependent variables. Linear regression models were used to analyze both quantitative and qualitative responses. Other regression formulations involving the choice of animal health service delivery as a binary choice dependent variable were tried. These approaches that are used to estimate models involving dichotomous response variables included the logit, probit and linear probability model (LPM) regressions. This was done because the model that fits the data set better could not be determined a priori. Unfortunately, none of the binary choice models fitted the available data. Thus, ordinary least squares (OLS)

models were used and were found to fit some of the data better. However, the OLS regression results depicted the presence of heteroscedasticity with respect to herd size. Herd size was therefore used to weight the data so as to obtain Weighted Least Squares (WLS) model and results improved (Gujarati, 1995;¹ Madalla, 2001). Thus, the R^2 , t, and F values increased significantly.

The following general equation represents the base model used for the analysis.

$$Y_i = \alpha + \beta X_i + \mu_i, \quad i = 1, 2, 3, \dots, N$$

Where Y_i is the continuous dependent variable for household i , α is the intercept term X_i is the explanatory variable for household i , β is the parameter, and μ_i is the error term, $\mu_i \sim (0, \sigma^2)$ of the unknown effects on the dependent variable. The specific expanded OLS model including more explanatory variables for estimation can then be written as in Equation (1):

$$Y_i = \alpha + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots + \beta_n X_{ni} + \mu_i \quad (1)$$

Where:

Y_i = Income from livestock for HH_{*i*}.

α = Constant

X_{1i} = Cost of delivery for HH_{*i*}

X_{2i} = Acceptability by HH_{*i*}

¹ Heteroscedasticity has never been a reason to throw out an otherwise good model (Damodar N Gujarati, 1995).

X_{3i} = Herd size for HH_i

X_{4i} = Accessibility to services by HH_i

X_{5i} = Availability of services to HH_i

X_{6i} = Education of the herder HH_i

X_{7i} = Extension services to HH_i

X_{8i} = Availability of credit to HH_i

X_{9i} = Gender of HH_i

X_{10i} = Household size HH_i

X_{11i} = Income level HH_i

X_{12i} = Age of herder HH_i

X_{13i} = Service demand HH_i

X_{14i} = Mode of animal health service delivery for HH_i

X_{15i} = response time

HH stands for Household

4.3.2.2 *Description of the hypothesized variables*

i. Monthly income level of herder

The monthly income level of herder was used in this study as the dependent variable.

Computation of this variable involved the determination of monthly income per household from livestock products in Kenya Shillings. The annual household income was obtained by aggregation of yearly sales of livestock and livestock products such as milk and milk products. To obtain the household's monthly income, the annual

household income was divided by the number of months in a year (12) and this was further divided by the total number of households.

ii. Modes of animal healthcare service delivery

High transaction costs may make the demand and supply of animal health services unattractive (Van, Thys, Elyn, Marcotty, and Geerts 2008). It was hypothesized in this study that the choice of service delivery system used affects pastoral household income, with herders preferring to use professional services having higher returns in terms of income from livestock, than those using other modes of delivery system. In this study, the most used animal health delivery systems in each area were identified. The delivery systems considered included veterinarian (GOK or private), self treatment using modern medicine, self-treatment using traditional medicine, or community based animal health worker.

iii. Household size

The size of a family is assumed to be directly proportional to its demand for food and income to secure other necessities. Larger pastoral families are expected to be secure in terms of labor provision, and therefore can afford to maintain larger herds compared to smaller households. Availability of labor is expected to facilitate migration with livestock, leading to higher productivity and hence income. This study considered the size of a household as the sum total of a pastoralist, his spouse/s, offspring and dependants present at the time of the interview. The number of persons comprising a household was then converted to adult equivalents (AE) (Rueben and Lary 1978; Nyariki, Wiggins and Imungi, 2002). An adult equivalent is defined as the

proportionate increase in income per adult necessary to maintain a certain level of household living standard given same change in demographic circumstances. For the purpose of this study, an adult equivalent was treated as one adult equivalent whereas for children below eighteen years, one child was treated as being equivalent to half of an adult equivalent. All children below the age of 18 years were calculated as one half of an adult equivalent (Nyariki *et al.*, 2002). The concept of AE assumes that life-cycle stages have an important influence on the needs of members or individuals of the same household.

iv. Acceptability of an animal health care system

Acceptability of an animal health care system is determined largely by the attitude of the farmer towards AHC provider, his/her evaluation of the intervention, and ability to and (affordability) and willingness to pay (Van *et al.*, 2008). Since most households are poor, it was hypothesized in this study that they will prefer self-treatments other than the costly services by CAHWs, leading to poor productivity and low household income. Acceptability was assessed by determining the number of household heads that were satisfied with the animal health services offered as well as determining the number who could afford to pay for the services and inputs.

v. Accessibility of an animal health care system (hours taken to animal health service provider)

Accessibility (the availability of Government, NGOs, and private animal healthcare providers, sources of livestock drugs and time required and frequency of use of the nearest animal healthcare provider and livestock drug store by the household) influence motivation for the use of veterinary services (Heffernan, 2001). It was

hypothesized in this study that use of quality services improved productivity and hence income. It was further hypothesized that since most veterinary clinics were located on the main roads and in market centers, far away from the location of the households, household heads preferred self treatments other than services by the veterinarians, paraprofessionals and CAHWs. Access to animal health services was examined in three different ways: first by specifically asking households why they choose the mode of service delivery they used during the reference period; second, by asking them how long it took them to get to the nearest roads and markets where drug shops and other veterinary services are located (Haffernan, 2001; Van *et al.*, 2008) and finally by directly asking all respondents whether they would be able to obtain these services as and when they required.

vi. Availability of services

An important factor contributing to the quality of Animal Health care (AHC) is its availability and this availability is determined by the demand for, and supply of, services (Van *et al.*, 2008). In this study, it was hypothesized that in situations where animal health service deliverers (AHSDs) were not easily available, household heads preferred self-administered treatment other than other modes of service delivery. This compromised productivity as well as income. Availability of veterinary services was estimated by estimating the time taken by the AHSD to respond to a household heads call.

vii. Distance to the veterinary clinic

The likelihood of accessing quality services from a veterinary clinic becomes low as the distance of the clinic from the home increased, leading herders to opt for self

treatments. It was hypothesized in this study that long distances to livestock healthcare providers including veterinary clinics minimized accessibility to quality services, with farmers resulting to self-treatments and hence compromising productivity and income. Focus groups and individual interviews were held to transcribe livestock healthcare provider maps. The mapping exercise detailed the distance, availability of Government, NGO and private animal healthcare providers and sources of livestock drugs. In the semi-structured questionnaires, herders were also asked specific information regarding the distance, time required and frequency of use of the nearest animal healthcare provider and livestock drug store (Haffernan, 2001). Distance traveled by a herder and his livestock to the nearest livestock healthcare provider was measured in kilometers. Distance was assigned 1 if less than 5 km, 2 if between 6 and 10 km, 3 if between 11-15 km and 4 if greater than 15 km.

viii. Animal health service demand

Service demand is defined as what people ask for, need and value so much that they are willing to invest their own resources, such as time and money, in order to receive the services. Some of the indicators for service demand include: farmers having access to services; farmers using the services; farmers having increased income from livestock as a result of service use; and increased competition between service providers.

It was hypothesized in this study that since it is very difficult and economically unviable for a herder to transport a sick animal to a veterinary clinic or to an animal health service provider located far away from the household, household heads will

prefer self-treatments, hence compromising livestock productivity and income. For the purposes of this study, service demand was determined by asking household heads what action they took when they had a sick animal (Van *et. al.*, 2008).

ix. Cost of veterinary services delivery /affordability

It was hypothesized in this study that household income was affected by the choice of animal health service delivery chosen. It is expected that households using professional service delivery systems record higher productivity from their livestock and hence higher incomes. Although it is expected that herders with higher incomes would go for professional veterinary services, results of a study done by Vinod, Dina and Deigner (2002) indicates that price is not an important determinant of the decision to use veterinary services. They found no variation in price elasticities across income groups. The affordability parameter evaluated minimum necessary level of preventive and curative animal healthcare in each district. The first step was to calculate the 'ideal' treatment cost for a variety of livestock diseases. The 'ideal' treatment regime and costs were obtained from key informants i.e. government and private veterinarians and animal healthcare assistants in each of the districts. Next, the actual expenditure on animal healthcare was evaluated. Semi-structured interviews were then used to elicit specific information regarding animal health expenditure over one month's intervals for a period of one year for the households involved.

x. Extension services

In incomplete animal health care markets there are information failures. Assuming perfect knowledge in a healthcare market means that the herder is aware of the

health status of his animals and knows all the options available to contribute to the improvement of their health. It is also assumed that the herder knows how much each of these options can contribute to enhance their animals, health and is able to evaluate the relative quality of each of these options. From a market economic perspective, customers of animal health services have limited knowledge and information on the available treatment/preventive options (Leonard, 1993, 2000). This information asymmetry as a result may result in adverse selection of a veterinary service. In this study, it was assumed that adverse selection of AHC services occurred and that providers of quality services could not be distinguished from providers of inferior quality and quantity veterinary drugs could not be distinguished from substandard or counterfeit drugs, resulting in the household head preferring self-administered treatments to treatments by other AHSDs and hence compromising livestock productivity and household income. Availability of extension services was determined by asking the household heads how often they received advice from AHSDs.

xi. Education of the herder

The level of education attained by the head of the household influences (i) access to information, (ii) decision making, (iii) income and consequently (iv) livelihood security of a household, Education was included in this model to represent quality of human capital, as it is thought to be largely responsible for improving access to new technology and general economic welfare (Schultz, 1990). Moreover, on the job training has been shown to contribute substantially to human capital (Bryant, Bawden, and Saupe, 1991). Educated and experienced herders are more likely to understand the need to use quality animal health services for increasing their

productivity. Knowledge on improved animal husbandry has been found to have a true relationship with the demand for veterinary services (Tambi *et al.*, 1999). A reduction in monthly household income is, therefore, considered a decreasing function of education. The variance 'education' was therefore hypothesized to positively influence the choice of a service provider, with educated farmers, who are aware of quality veterinary services, opting for services provided by professional veterinarians leading to high productivity and higher incomes from livestock and livestock products. Muyanga (2008) pointed out that education provides an opportunity for pastoral households to diversify their livelihood portfolios. In the present study the level of education of a household was assigned a value of 1 if not gone to school, 2 if attained adult education, 3 if attained secondary education, 4 if attained secondary education, and 5 if attained tertiary education.

xii. Gender of household head

This was an independent variable for the sex of the household head. Although the government of Kenya has made efforts to promote women's right, as observed by Marinda and Heidhues (2004) while working in West Pokot District of Kenya, there are still clear gender inequalities in pastoral areas.

A major transaction cost in veterinary service delivery might be the larger 'social distance' between trained personnel who are mostly men, and the large portion of their clients who are mostly women. Together with a paucity of extension services directed towards pastoral women, it was hypothesized in this study that these factors might limit the availability of veterinary services to the women-headed household and

hence reduce productivity and household's monthly income in households headed by women.

xiii. Availability of credit to Household heads

Due to the high transaction costs incurred in animal health care service delivery, (Van *et. al.*, 2008), it was hypothesized in this study that access to livestock drugs on credit would increase the availability of drugs to herders and hence influence the choice of veterinary service, with more farmers tending to self-administered treatments other than services by professionals, paraprofessionals and CAHWs. Likewise, availability of credit to herders in terms of money will build their financial capacities, and once built; they will opt for services by professional veterinary services other than self-administered, and hence increase productivity. Availability of credit was determined by asking how many people assessed credit facilities.

xiv. Herd size

The size of a household herd is a measure of its wealth (Mango, Cheng'ole, Kariuki, and Ongadi, 2004) found that the 11 Chamus of Njemps flats in Baringo are unlikely to consider income from any other source as wealth, unless it is invested in buying livestock. In most pastoral communities, wealth and well being are measured in terms of the number of livestock owned. It is assumed in this study that the level of income of a pastoral household is a function of its herd size. Although different herd sizes have varying labour requirements (Dahl and Hjort, 1979), the number of persons supported by a herd is assumed to be proportional to its size. The size of the herd determines the supervision of a household and level of poverty. Herd size was measured in terms of Tropical Livestock Units (TLUs). A tropical Livestock Unit (TLU)

is the common unit for describing livestock numbers of different species, as a single value. It provides a convenient method for quantifying a wide range of different livestock types and sizes in a standardized manner. For the purposes of this study, the standard used for one TLU was one cattle with a body weight of 250Kg (Peter, Smith, Cellarious, Coppock and Barret, 2001; Solomon, de Leeuw, Grandin and Neate, 1991; IPAR 2002). The number of each type of livestock owned by a household was converted to TLUs and then added together to give total TLUs. The TLUs were derived using average weights of the different sex and age categories of cattle, sheep and goats estimated from previous studies (Kristjanson, 2004). In this study, a bull is equivalent to 1.29 TLU, a cow= 1 TLU, a calf= 0.4 TLY and a sheep or goat= 0.11 TLU. A donkey was 1 TLU and a camel 1.5 TLU. Conversion of livestock holdings into TLU equivalents was for the purpose of standardizing different animal kinds and classes into a universal unit to allow comparison between households and strata.

xv Age of herder

The age of a household head in years is expected to determine a household's access to and ownership of livelihood assets and means of production including livestock. This in turn determines the amount of wealth at a household's disposal accruing from livestock and livestock products. A household headed by a young person was therefore expected to make less money from livestock and livestock products than that headed by an older person. However, beyond a certain age, the reverse may be true as assets are shared out among siblings and income declines. It is expected that poor experience in youth headed households is likely to lead to the inability to make timely and appropriate decisions that enhance sustainable

livelihoods and wealth creation making them relatively poorer than households headed by older persons. While Shiferaw and Holden (1998) underscored the positive correlation between age and perception of problems in a farming system, Bellon and Taylor (1993) argued that older persons are less likely to engage in productive farming practices. The age of a household head is a categorical variable and was assigned a value of 1 if aged between 15-25 years, 2 if aged between 26-34 years, 3 if aged between 35-45 years, and 4 if aged over 46 years.

xvi. Response time

The time taken by the animal health service deliverer to respond to a herder's call is expected to determine the household's income in the sense that delayed services lead to delayed interventions which lower productivity levels and hence income. Response time was obtained by asking the herder approximately how long the animal health service deliverer took to respond to his call. The response time is a categorical variable and was assigned a value of 1 if response time takes hours, 2 if it takes days, 3 if it takes a week, and 4 if it takes more than a week for the animal health service deliverer to respond to a herder's call.

xvii. Satisfaction with service

The level of faith for a veterinary service dictated the mode of a veterinary service chosen. It was hypothesized in this study that poor faith in the most available service in the area (CAHW) left herders with only one option-self treatments hence resulting in lower productivity and income. Service satisfaction was determined by asking herders if they were satisfied with the veterinary services available. The answer to the question was either a yes or a no.

xviii Per capita daily income

The per capita daily income based on adult equivalents was used in this study. The first step in the computation of per capita daily income involved the determination of annual household income in Kenya shillings. The annual household income was obtained by aggregation of yearly sales of farm produce, livestock, livestock products, value of produced goods consumed at home, wage of employed household head, and remittances from members of households employed elsewhere. To obtain the household's daily income, the annual household income was divided by the number of days in a year (365). This was further divided by the total household adult equivalents to arrive at per capita daily. The level of a household's income is a major determinant of food security (Nyariki *et al.*, 2002), livelihood security and therefore a measure of poverty level. Households with high income per adult equivalent are expected to be more livelihood and food secure than those with low income levels.

xix Distance to pasture

Forage availability is the determinant of the direction and distance of the opportunistic movements by the African pastoralists to make use of different ecological niches (Sanford, 1983; Niammir, 1994). The assumption in this study is that the distance traveled in search of pasture is an indicator of forage availability, a reflection of range condition and productivity and therefore livestock productivity. Because secure livelihoods can only be attained when resources needed for production are accessible, this leads to the hypothesis that the longer the distance to

pasture, the less secure the livelihoods and thus the poorer are the households. Daily distance traveled by a herder and his livestock in search of pasture was measured in kilometers.

CHAPTER FIVE

DESCRIPTION OF ANIMAL HEALTH CARE DELIVERY SYSTEMS IN WEST POKOT AND TURKANA DISTRICTS

5.1 OVERVIEW

This chapter presents part of the study results which include demographic and social economic characteristics of study respondents such as age, sex, and education level. Compound mapping and household characteristics of the study area such as herd size as well as household sizes are described. The chapter also describes the status of livestock diseases as well as that of animal Health Service delivery systems in the two districts. It describes the basic social infrastructure of the two districts, including means of livelihoods. Secondary data, participatory research methods and primary data from a random sample of 160 herders were used. Nine veterinarians, eighteen animal health technicians and sixty community based animal health workers were interviewed. Data discussed in the chapter were analyzed using descriptive statistics

5.2 BASIC SOCIAL INFRASTRUCTURE

5.2.1 West Pokot district

5.2.1.1 *Compound mapping*

By the time of the study, the families of the pastoralists understudy comprised of family members, friends, and neighbours. Within this milieu, livestock keeping was often a shared activity. Though livestock were individually owned, land and watering

points were communally owned. All livestock was kept under free range grazing and all herders interviewed 80/80 (100%) practiced transhumance. During the time of the study, livestock had migrated to dry grazing areas in October 2004 and were expected back in April 2005. However, due to poor performance of the long rains, which contributed to inadequate pasture, 90% of cattle which had moved to dry grazing areas (mostly across the border to Uganda) had not been brought back.

Dry season grazing areas included: along rivers, on high lands, and at neighbouring communities and countries. During the rainy seasons, pastures were easily available and livestock were grassed on average, less than five kilometers away from home. However, pastures were not reliable during dry seasons and the quality of fodder was poor. As a result, during the dry season, herders moved to the neighbouring districts and countries in search of pasture and water. On average, during the wet season, herders grassed their livestock within distances of less than five km from their homesteads. However, during dry seasons, they covered distances of more than forty km in search of pasture and water. Table 3 shows distances covered by households in West Pokot district to grassing areas during both dry and wet seasons.

Results of this study agree with those of Nyariki and Ngugi (2002) who reported that migration is a traditional pastoral strategy used to track forage and water as well as escape from natural shocks including diseases, droughts and tribal conflicts. Mobility is also used to spread pressure on land and therefore conserve environment. Herd mobility makes land a 'variable rather than a fixed resource' and ensures optimal use

of the range. Migration is expected to increase productivity and consumption and therefore reduce poverty (Kabubo-Mariara, 2002).

Table 3: Distances covered to grazing areas during wet and dry seasons in West Pokot District

Season	Distance Covered in km	Number of Households	Percentage
Wet	< 5	57	71.3
	6-10	4	5.0
	> 40	19	23.8
Dry Season	< 5	2	2.5
	6-10	2	2.5
	11-20	10	12.5
	21-40	12	15.0
	> 40	54	67.5

5.2.1.2 Household characteristics

By the time of this study, the average household size was 9.89 adult equivalents, and the average age of the household head was greater than 46 years of age. Concerning the level of education, 67 (83.7%) of the herders interviewed were illiterate, 10 (12.5%) had attained primary education, and 3 (2.5%) had attained secondary education. Concerning the gender of household heads, all households

80/80 (100%), were male headed and the average monthly income for the households stood at Ksh. 2,424.00. None of the households had access to credit.

5.2.1.3 Sources of livelihoods

Household income was mainly derived from livestock and livestock products (94.7%) of the household monthly income, employment accounted for (2%), "Qhat" (miraa) selling for (1.38%), and crops for (1%). Other resources found in the district included minerals such as gold, copper and chromium, which were however, not found in commercially viable quantities. These accounted for only 0.26% of the total household monthly income. Pastoral diversification in Turkana district has also been reported by Watson and Van (2008). Concerning herd size, on average, the herd size was 39.34 TLUs. Table 4 shows sources of livelihoods in west Pokot district in the year 2006.

Apart from livestock, employment, miraa, crop, and mining, households also dependent on relief food relief food is food that a household acquires from sources outside their main livelihood activities, normally from the government, the United Nations Organizations, non-governmental Organizations (NGOs) or religious organizations.

The findings of this study are consisted with those of Herlocker (1999) and Oba and Lusigi (1987) who also reported that livestock production is the main livelihood activity in the semi-arid rangelands of Kenya. However, due to high risk and uncertainty that characterize pastoral production systems, pastoralists normally rely

on fall-back livelihoods to cushion them from natural shocks such as droughts. Cultivation of crops, for example, is one of the major strategies used by the pastoralists to supplement milk and meat during bad seasons (Sikana, Kerven and Behnke, 1993). Other alternative livelihoods include honey production, trading and charcoal burning, among others. Expanding livelihood portfolios in ways that encourage local growth linkages is usually meant to augment subsistence from livestock.

Table 4: Sources of livelihoods in west Pokot district in the year 2006

Source	Percentage
Livestock	94.7
Employment	2.0
Miraa	1.4
Crop	1.0
Mining	0.3
Others	0.4

Relief food is usually obtained without any type of payment (Seamen et al., 2000). Dependency on relief food indicates poverty, a decline in human support capacity of the land, and non-functioning of pastoral mitigation strategies.

Employment outside the pastoral sector is one important way of diversifying sources of livelihood in pastoral areas. Although some offspring were adults currently living off-pastoral sector for various reasons such as employment and marriage, FGDs revealed that by tradition, most of them remitted part of their wages to their families back home, thereby favorably altering their resource base. Wage transfers received from employment members is assumed to ease the dependency on livestock and resource base, and lower poverty (Kabubo-Mariara, 2003).

The populations in ASALs areas, as it is evident in the results of the two districts, depend heavily on livestock for their livelihoods. This finding is consistent with the findings of Barret and Luseno (2004) who reported that livelihoods in Turkana district are primarily based on extensive livestock production with most cash earnings coming from sales of livestock or livestock products. This dependency should be reduced through the diversification into new crops, livestock and natural resource based products. This is in agreement with Scoones and Wolmer (2006) who recommends that revitalizing pastoral economies requires further support to encourage commercialization and diversification. Policies should aim to increase income-earning options (for example through education) and remove the constraints that prevent pastoralists from fulfilling their undoubted economic potential.

Predominantly, the poor of the world depend directly on natural resources, through cultivation, herding, collecting or hunting for their livelihoods. Therefore, for the livelihoods to be sustainable, the natural resources must be sustainable. Degradation

of natural resources strikes at the heart of the ability of the poor to develop sustainable livelihoods (Sustainable development timeline, 2009).

5.2.1.4 *Communication networks and other infrastructure*

By the time of the study, telephone services distribution was not well developed and except for privatized telephone services (Safaricom and Telkom), there were two divisions without telephone connections. Roads and transportation facilities were generally leading to or from border markets, as were most other important infrastructure in the area. However, the infrastructure in the two districts (Roads, communication networks, holding grounds, and stock routes for livestock) was in poor state and hence un conducive to efficient livestock marketing.

Constraints significantly affecting delivery of veterinary services include: transportation, communication, and public utilities. Inadequate transportation infrastructure poses serious obstacles to veterinary service delivery. Although Oruko (1999), found distance inconsistently significant in the demand for veterinary services, reliable accessibility to the country side is essential to organized disease surveillance, disease investigations, and emergency response; and provision of clinical services. In addition, poor infrastructure greatly increases transaction costs and inefficiencies and inadequate communication facilities lead to poor dissemination of market information. The findings of this study are consistent with those of a study done in Zimbabwe by Woods (2000), who reported that transaction costs mainly related to distance are the major constraint in determining the expressed demand for animal health services. On the other hand, good infrastructure directly facilitates efficient market and trade performance, and, by extension affects producer prices.

Thus poor infrastructure in the target districts does not only inhibit veterinary service delivery, but also impairs the marketing of livestock products from outlying areas to urban centers. When emergencies occur, the effectiveness of the response can be severely hampered by problems of accessibility and costs.

5.2.1.5 *Sources and uses of water*

Water fetched was mainly used for drinking by both humans and young stock, cooking and washing utensils, and bathing small babies in that order. Sources of water included boreholes, unprotected dams, rivers, and ponds. Of the total 80 households included for sampling in this study, 62/80 (77.5%) got water from boreholes, 15/80 (18.8%) got from ponds, 2/80 (2.6%) got water from the river, and 1/80 (1.3%) got from unprotected dams. During the same season, 32/80 (40%) of the households got water between 1-5 km away from the homes, 30/80 of them (37.5%) got water between 6-10 km, 12/80 (15%) got water between 11-20 km, and the remaining 6/80 (7.5%) got water more than 20 km away from their homesteads.

Concerning time taken to fetch water, 39/80 (48.8%) of the households spent between 1-2 hours per day fetching water; 22/80 (27.5%) spent 3-4 hours fetching water, whereas 19/80 (23.8%) of the households spent more than 4 hours. Table 5 shows sources of water, table 6 shows distances covered to reach water sources, and table 7 shows time taken to fetch water by the 80 households interviewed in West Pokot District.

Despite the good objectives of the National Environmental Health Policy, the pastoralists in West Pokot and Turkana districts had to do with limited access to essential amenities such as health, water, and toilets.

Table 5: Sources of water in selected divisions of West Pokot District in 2006

Source of water	No. of households	Percentage
Borehole	62	77.5
Ponds	15	18.8
Rivers	1	1.3
Unprotected dams	1	1.3
Piped water	1	1.3
TOTAL	80	100

Both Districts suffered serious water problems with the burden of collecting water falling mainly on women and the girl child. Women and girls fetched water from as far as 20 km away on average. An average family used 20 litres of water per day, and besides the boreholes being inadequate, some had either collapsed or were in verge of collapse.

5.2.1.6 Education

Schools and health centers were sparsely located and lacked trained and qualified human resources, equipment and basic suppliers. By the time of the study, the district had 226 pre-primary schools having a total of 9,512 pupils 51.9% of whom were males and 48.1 females.

Table 6: Distances covered to water sources in selected divisions in West Pokot District in 2006

Distance in km	No. of households	Percentage
1-5	32	40.0
6-10	30	37.5
11-20	12	15.0
>20	6	7.5

Table 7: Time taken to fetch water in selected districts of West Pokot District in 2006

Time taken in Hours	Number of Households	Percentage
1-2	39	48.8
3-4	22	27.5
>4	19	23.8

There were 337 primary schools with a total enrolment of 100, 775; 54, 155 (53%) were boys and 48,609 (47%) girls. There were 13 secondary schools with 2,752 students. Tertiary institutions in the district included six youth polytechnics with 176

students and one family life-training centre. It was estimated that 86% of eligible children enroll for primary education. Transition rate from preparatory schools to primary was estimated to 88% while that from primary to secondary was 47%. This low transition rate was mainly due to early marriages and failure to sell livestock to raise school fees.

The results of this study indicate that the majority of the youth in the study districts did not access education. This is despite the National Youth Policy formulated in Kenya in 1997, whose objective was to promote youth participation and civic affairs and ensure that youth programs are youth centered (Kenya National youth policy, 1997). Besides, the results indicate that the girl child did not have an equal opportunity to attend school. This was partly attributed to early marriages, due to both cultural norms and poverty. PRA results indicated that girls fetched a lot of livestock for their parents in form of dowry. Girls, once they have been circumcised at the age of 12 years are considered ready for marriage. A girl married so early missed out from other developments such as going to school and developing a career.

Table 8 shows the various distances from the 80 households in West Pokot District to the nearest school.

5.2.1.7 *Accessibility to the nearest health facilities*

The district was understaffed by health services in both quality and quantity. By the time of the study, 80 (100%) of the households took less than 5 hours to walk to the

nearest medical centre, the same percentage of households did not afford to pay for the services and described the services offered as unsatisfactory.

5.2.1.8 Household sources of and access to food

On average, 70% (112/160) of the households interviewed in both districts had on average one meal per day.

Table 8: Various distances of the households to the nearest school in West Pokot District

<i>Distance in km</i>	<i>Number of households</i>	<i>Percentage</i>
Less than 5	2	2.5
6-10	38	47.5
11-20	7	8.8
Over 20	19	23.8
No accessibility	14	17.5
TOTAL	80	100

The remaining 30% (48/160) had on average, two meals per day. However, these figures were bound to change during the rainy season when more people took two meals per day. 100% (160/160) of the households interviewed said that meals were not heavy enough besides being nutritionally unbalanced. Food was not available in sufficient quantities and food prices at the local markets were fluctuating. High food costs were attributed to costs incurred in transportation of food to the local markets, as a result of poor infrastructure.

Sources of food included livestock, purchased food, grown food, wild game, wild fruits and vegetables, and to a lesser extent relief food. Maize and sorghum were the most common crops grown but this was done at subsistence quantities. Hardly any cereals were in surplus for sale. However, in areas such as Lokori division where irrigation was accessible; vegetables such as onions were grown for sale in the local markets, and sometimes for export to the nearby countries such as Uganda.

5.2.1.9 *Land use information*

In both Districts, Land was communally owned and was used mainly for livestock production and minimum crop farming. All the interviewees experienced land shortages at some point, for both cropping and grazing. This was attributed to increase in human population; land fragmentation in some areas; in-migration of farmers; increased livestock population; and land degradation by overstocking. Grazing was free range. Land shortage affected the pastoralists' lives in several ways namely: food shortages; low income; violent conflicts with other users; and loss of livestock and crops.

The results of this study are consistent with reports from various authors who point to problems of increased range degradation due to overgrazing and impoverishment of sedentary pastoralists (Hogg, 1986; Krugmann, 1996; Campell, 1999; Talle, 1999; Farah *et al.*, 2003). The natural resource base on which the livelihood of the rural poor in SSA depend is deteriorating at an alarming rate. Land, the most important natural asset, suffers from severe degradation in the form of soil erosion, nutrient

depletion and deforestation. Loss of arable land due to soil erosion is a widespread phenomenon (IFAD, 2002).

Some parts of Kenya have witnessed excessive deforestation, land degradation, and water scarcity over the last decade. The worst hit regions are those generally classified as Arid and Semi-arid lands (ASALs) where the main economic activities are subsistence and pastoralism (IFAD, 2002).

5.2.2.0 *Community views and poverty self awareness*

Poverty has been defined as a pronounced deprivation in well-being. It means lacking food, shelter and clothing, being sick and having very limited or no access to health services, being illiterate and having few or no educational opportunities, having little security and being very vulnerable to outside events such as natural disasters and economic crisis, being excluded from power and political access; and, most of all, having no hope for the future (Thornston *et al.*, 2003).

Pastoralists in both districts had their own measures of poverty. During FGDs, a very rich man had at least 50 cattle, 150 goats and sheep, 30 camels and 20 donkeys. A very poor man had livestock in the tune of 5 cattle, 15 goats and sheep, 2 camels and 1 donkey. Of the 160 households interviewed in both districts, 102/160 (63.75%) admitted to being poor, whereas the rest, 58/160 (26.25%) said that they were not poor. Causes of poverty were mainly attributed to having few or no livestock. The interviewees attributed loss of livestock to droughts, livestock diseases and raids in that order. At the time of the study, a lot of livestock had been cleared by either drought, diseases, or raids.

Majority of the interviewees did not expect the state of being poor to improve, the reason given being that livestock continued dying because of diseases and droughts, and a lot more to raids. Farming was not reliable due to unreliable rains and soil infertility.

The most commonly used definitions of poverty are designed by 'outsiders' and focus mostly on income or expenditure. Other 'outsiders' have realised and shown that non-economic considerations are often more, or at least equally, important to 'insiders' and therefore need to be integrated into the poverty concept. Gender aspects of poverty are rarely taken into account, nor have 'insiders' concepts so far been made operational. It would appear consistent for those who give a high priority to participatory development to base their poverty concepts on 'insiders' perception of poverty and deprivation.

5.2.2 Turkana district

5.2.2.1 Household characteristics

At the time of this study, the average house hold size was 7 Adult equivalents, and the average age of the household head stood at more than 46 years of age. In both West Pokot and Turkana Districts, household sizes were big. The motivation for fertility springs from a general absence of certain basic needs in rural parts of countries including public health services, old age security, water, and sources of fuel. Children are born and raised in poverty. A large proportion suffers from undernourishment. They remain illiterate, and are often both stunted and

wasted. Undernourishment retards their cognitive (and often motor) development (Dasgupta, 1993).

Concerning education of the household head, 67 (85%) were illiterate, 2 (2.5%) had attended adult classes, 9 (11.25%) had attended primary school, and 2 (2.5%) had attained tertiary education. Concerning household heads, all households 80 (100%) interviewed were male headed. Households were poorly endowed with wealth and income and the average monthly income level stood at Ksh 3, 164, with none of them having access to credits.

Although there were several animal health service deliverers among whom livestock owners could go for assistance, a livestock owner's choice of an animal health service delivery was narrowed by his accessibility to them. About 54 (67.5%) of the households interviewed took less than 5 hours walking to the nearest roads and market centers where such facilities were located, whereas 26 (12.5%) of the households took more than a day to walk to the nearest main roads and markets. On average, the distance to the nearest roads and markets stood between 6-10 km. concerning herd size, on average, the herd size was 90.3 TLUs.

Means to the main roads and local markets included walking, use of mechanized transport and bicycles. 51/80 (63.75%) of the respondents walked to main roads and markets, 28/80 (35%) used mechanized transport, and the remaining 1/80 (1.25%) used bicycles.

In relation to accessibility to health facilities, most of the medical facilities in the study area were owned and managed by churches and 80 (100%) of the households interviewed took less than 5 hours to walk to the nearest medical centre, 80 (100%) did not afford to pay for the services and 72 (90%) described the services offered as unsatisfactory.

Dry season grazing areas included: along rivers, on high lands, and at neighboring communities and countries. During the rainy seasons, pastures were available and livestock were grassed on average, less than five kilometers away from home. Just like in neighboring West Pokot District, pastures were not reliable during both the dry seasons and the quality of fodder was poor. Table 9 shows distances covered by households in Turkana District to grassing areas during both dry and wet seasons.

The results of this study indicate that livestock owners in the two districts cover long distances in search of water and pasture. These findings are in agreement with those of Field (2005) who reported that droughts are a part of the national cycle in Turkana District. The traditional strategy of pastoralists is to move to areas with higher rainfall, and then return to traditionally drier areas when the rains arrive and both pasture and browse is renewed.

Kenya has expansive and porous borders with its neighbours, where there is little or no coordination and collaboration with the neighbouring countries in regulating animal movement and disease control across the borders, which makes control of trans-boundary diseases a major challenge. Also, due to the "perceived relative

economic stability” in Kenya, Kenyan livestock markets attract a lot of livestock trade from the neighbouring countries.

Currently, there is inadequate enforcement on the existing rules and regulations relating to the movement of livestock and livestock products both within the country and across national borders. Such enforcement is necessary for the control of livestock movement as it would serve the twin purposes of minimizing stock theft as well as control livestock diseases.

5.2. 2.2 *Livelihoods*

Household income was derived from livestock, charcoal selling, mixed farming and crops. Livestock and livestock products accounted for 93.2% of the total household monthly income, crops accounted for 4.5%, and charcoal selling accounted for 1.4 %, relief accounted for 0.6%, mixed farming accounted for 0.3%. Table 10 shows the sources of livelihoods in Turkana district by the time of the study.

Approximately, 70% of the human populations inhabiting Turkana and West Pokot districts are nomadic or semi-nomadic pastoralists. However, the impact of drought, increasing insecurity, and famine has led to a growing emergence of sedentary communities' experimentation with alternative livelihoods (Watson and van Binsbergen, 2008).

Table 9: Distances covered by households to grazing areas during both dry and wet seasons, in Turkana District.

Season	Distance in Km	Covered	Number of Households	Percentage
Wet	< 5		57	71.3
	6-10		4	5.0
	> 40		19	23.8
Dry Season	< 5		2	2.5
	6-10		2	2.5
	11-20		10	12.5
	21-40		12	15.0
	> 40		54	67.5
	TOTAL		80	100

For the nomadic pastoralists in West Pokot and Turkana districts, livestock forms an integral part of their economic, social and spiritual life. As well as food, livestock are used in various social functions such as payments of bride price and some traditional rituals, and of course, are a kind of currency. However, the potential of livestock as a source of livelihood and income for the local people is limited by the lack of good markets; commercial networks; knowledge of animal diseases and local business acumen.

Table 10: Sources of livelihoods in Turkana District in the year 2006

Source	Percentage
Livestock	93.2
Crops	4.5
Charcoal selling	1.4
Relief	0.6
Mixed farming	0.3

As a result, the pastoralists were observed in general to increasingly pursue non-pastoral income strategies to meet consumption needs and to buttress against shocks caused by climatic fluctuation, animal disease, market failure and insecurity (Little *et al.*, 2001). Unfortunately, the poor transportation and communication infrastructure in the two districts restrict trade and income generation opportunities. In Turkana District, key areas of activity included sedentary agriculture particularly along the Turkwel River, where settled farmers and agro-pastoralists grew maize, sorghum, oranges, mangoes, bananas, and vegetables. This finding is consistent with the finding by Watson and van Binsbergen (2008).

Generally, livelihoods in Turkana and West Pokot districts were primarily based on extensive livestock production and most cash earnings came from the sales of livestock or livestock products. In the two districts, minimal pastoral diversification was evident. This was in terms of pursuit of any other non-pastoral income-earning activity in both urban and rural environments. This included various forms of retail

trade (selling of crops, charcoal, employment, mining, and selling of wild products such as honey. Barret and Luseno (2001) also reported minimal pastoral diversification. Gold, Rubi, blue safire, and gamestone were mined; however, miners rented the land for mining leaving the locals benefiting from labour services only. Land was given to miners on promise of incentives which was not honoured. The results of the study indicate that community owned land was not secure and if land was individually owned, outsiders would be renting it for a fee.

Copping with drought included: borrowing or renting shambas in the highlands for crop farming; assisting in harvesting crops to be paid in kind; sinking deep water wells; eating wild fruits and vegetables (Sokonde), preserving milk in guards; eating dried meat; and eating preserved termites (preserved in honey) (amuna). A mixture of meat, honey, termites, fruits from the fig tree and butter was reported to last upto three (3) years.

5.2.2.3 *Herd structure*

In both Turkana and West Pokot Districts, goats were kept by 150/160 (94%) of the households interviewed; sheep by 130/160 (81%); camels and donkey each by 88/160 (55%); cattle by 60/160 (37.5%); and chicken by 28/160 (17.5%) of the households.

The benefits of livestock as regular sources of income, in terms of both cash and barter, have also been detailed in numerous studies. In the Livestock Development, it

has been shown that poor farmers are increasingly relying on livestock as their main source of income. In addition, livestock are often the main way in which poor farmers can acquire real assets, providing a safety factor when difficulties strike. The asset-acquisition pathway usually begins with poultry, followed by small ruminants and pigs, with larger stock such as equids, cattle and buffalo acquired at later stages (Penjani, Paul and Espen, 2009).

Fishing in Lake Turkana is another, long standing, form of diversification. Fishermen along Lake Turkana migrate to follow the pattern of fish movement. The pastoralists supplement their livelihoods by selling the fish (Watson and van Binsbergen, 2008). Other activities include weaving of baskets, collection and sale of aloe (Field 2005; Griffith 2005; Watson and van Binsbergen, 2008), wild fruits, firewood (Little *et al.*, 2001; Ajele, 2003), and the production and sale of charcoal.

It was noted in this study that many of the diversification strategies that herders practiced earned very minimal incomes, rarely strengthening the sector, and were also destructive to the environment. These included activities such as cultivating in key grazing areas and charcoal making. This observation was in agreement with that made by Little *et al.* (2001), who observed that although income diversification is an increasingly important means for herders to manage risk, many of the diversification activities rarely strengthen the livestock sector. Diversification into livestock production is at risk from endemic and epidemic diseases of all types. Trans-boundary diseases including PPR, classical Swine Fever (CSF), African Swine Fever

(ASF), and Newcastle Disease (ND), whose potential for devastation of livestock development programmes has been demonstrated in the last decade.

5.2.2.4 *Communication*

In regard to communication, by the time of the study, there were five post offices and six sub-post offices in the district. The head office in Lodwar had an STD exchange system. There was also Safaricom and Telkom communication network systems in the district.

5.2.2.5 *Schools*

At the time of this study, the district had 175 pre-primary schools, 136 primary schools, eight secondary schools, two youth polytechnics and some medical training colleges. The first school was opened in the district in less than 40 years ago.

5.2.2.6 *Human diseases and accessibility to the nearest health facilities*

During a pairwise disease ranking in West Pokot District, the main human diseases reported were: Malaria, Arthritis, Typhoid, Kalazaar, Meningitis, Brucellosis, Diarrhea, and Tuberculosis. At the time of the study, most of the medical facilities in the study area were church owned. 80 (100%) of the households took less than 5 hours to walk to the nearest medical center, 80 (100%) did not afford to pay for the services and 72 (90%) described the services offered as unsatisfactory.

5.2.2.7 Sources of water

Water fetched was mainly used for drinking by both humans and young stock, cooking and washing utensils, and bathing small babies in that order. Sources of water in the district included boreholes, unprotected dams, rivers, and ponds. Of the total 80 households included for sampling in this study, 52 (65%) got water from boreholes, 1 (1.2%) got from the river, and 27 (33%) got water from the ponds. During the same season, 65% (79.3%) of the households got water between 1-5 km away from the homes; 3 of them (3.7%) got water between 6-10 km, and the remaining 12 (14.6%) got water more than 20 km away.

Concerning time taken to fetch water, 22 (26.8%) of the households spent between 1-2 hours per day fetching water; 21 (21.6%) spent 3-4 hours fetching water, whereas 37 (45.1%) of the households spent more than 4 hours. Table 11 shows sources of water, table 12 distances covered to water sources, and table 13 time taken to fetch water by the 80 households interviewed in Turkana District.

The results of this study indicate that pastoralists in West Pokot and Turkana Districts migrate long distances in search of pasture and water, and the main problem would be to control the major epizootics. Besides, the relative prosperity of Kenya in the greater horn of Africa makes it the major market for livestock from the region, most moved in illegally. Livestock movement, therefore, is another critical area that

requires a lot of inputs in control, as lack of organized disease control programs in these countries poses a constant threat of disease introduction to Kenya.

This finding is in agreement with findings of a study done by FAO (2007), which reports that in developing countries in general, movement of livestock is common in order to find grazing and water, move away from drought or follow natural seasonal migrations, or because of migrations precipitated by social tensions or local trade. Such movements inevitably bring livestock from different groups into contact. Where there are heavy concentrations of wildlife animals, the migrations of wildlife and livestock bring the two groups into contact.

Table 11: Sources of water in selected divisions in Turkana District in 2006

Source of water	No. of households	Percentage
Borehole	52	65
Ponds	27	34
Rivers	1	1.2
TOTAL	80	100

Such contacts become a source of disease dissemination (FAO, 2007). For example, the introduction of CBPP in the early 1990s into Botswana and Tanzania was due to movement of only a few sub-clinically infected animals from endemic areas. FMD, RP, Sheep Pox, PPR, ND, IBD, RVF, and others have been disseminated through such movements (FAO, 2007).

Table 12: Distances covered to reach water sources in selected Divisions in Turkana District in 2006

Distance in km	No. of households	Percentage
1-5	65	81
6-10	3	3.9
>20	12	15
TOTAL	80	100

Table 13: Time taken to fetch water in selected divisions in Turkana District in 2006

Time taken in Hours	Number of Households	Percentage
1-2	22	27.3
3-4	21	26.2
>4	37	46.2
TOTAL	80	100

As is the case with West Pokot and Turkana Districts, animal diseases constitute a major constraint to livestock production and the safe utilization of animal products world wide. As it was found out by Coleman (2002), for the poor, the impact of livestock diseases on lives and livelihoods is particularly severe. According to him, an outbreak of disease can mean the difference between sufficient food stocks and insecurity, between having a secure income to the loss of key household assets.

Moreover, the presence of livestock diseases also makes it difficult for the poor to participate in local and even the national livestock economy.

Livestock movement in West Pokot and Turkana Districts, in search of pasture and water is not only seasonal but follows defined routes. This is found to be the case in the rest of ASALs. There are well known watering and grazing points along the main trekking routes. Advantage can be taken to vaccinate livestock against major diseases before departure and on arrival back from dry season grazing areas, leaving the herder to deal with mainly management issues.

Apart from the long distances covered in search for water in the two districts, droughts were reported to occur regularly in the two districts, and these resulted to loss of livestock, collapse of local livestock markets and famines. This calls for measures to be put in place that will minimize losses occasioned by such droughts.

5.2.3 Conflicts in Turkana and West Pokot Districts

5.2.3.1 Status of conflicts in Turkana and West Pokot Districts

During the study period, in 4/160 (2.5%) of the households livestock had been taken away by force by the police for compensation for livestock previously stolen from neighbouring communities; and in 20/160 (12.3%) of the households livestock had been stolen through raids. At the same time, cattle raids taking place just before the interview were reported in 39/160 (48.1%), whereas in 28/160 (34.6%) of the

households experienced conflicts a few months before the interview and 13 (16%) of the households had experienced conflicts some years before the interviews.

Action taken in case of cattle raids included revenge (11.5%) of the households; peaceful mitigation (reported in 85%) of the households; intervention by the local authority (reported in 1.2% of the households) and 2.4% of the households reported that they did not take any action.

During FGDs, some of the factors reportedly contributing to violent conflicts included small arms proliferation; inadequate policy and state security; weakening and undermining of traditional governance systems; inappropriate government development policies; inadequate engagement with traditional government systems; political and socio-economic marginalization of pastoralists; and inadequate arrangements to cope with droughts and other emergencies.

Findings of this study are consistent with those of Mkutu (2008), who reported that violent conflicts involving pastoralists have become widespread and increasingly severe throughout much of the Horn of Africa. The researcher reported that some conflicts within and between pastoralist communities, such as raiding and cattle rustling, have a long history and have to some extent become an aspect of traditional pastoral culture.

Civil wars and other forms of violent conflicts are mainly rooted in 'under-development'. They are also highly detrimental to the development process, because the level of civilian destruction in such conflicts can be very high. Moreover, the

conditions of under-development that conflicts spawns in the long run often results in more death and suffering from disease, hunger, and low food consumption than the actual fighting (Hassan, 1997).

The causes of conflicts in the North rift region of Kenya include the high premium placed on livestock and livestock products, continuation of traditional practices such as cattle rustling and dowry, expansion of agricultural lands, commercialization of pastoralism, episodic drought and insecurity (Hassan, 1997). The protracted conflict and insecurity in the pastoral areas of the North Rift contribute widening the gap between pastoral groups and the rest of the country. Economically, it prevents investments and hampers development programmes. Due to the current levels of insecurity in the region, no viable economic activity or empowerment can thrive (Hassan, 1997).

In both Districts, it was reported that women played a very big role in conflicts through singing songs of praise to the 'morans' who had been involved in successful raids. A son or husband will not go raiding unless with an approval from the mother or wife respectively. If a man goes for raids without permission from his mother or wife, this is considered as a bad omen. Women felt the loss more especially when their sons and husbands were killed during raids. Female circumcision was also very costly as well as dowry. Women benefited a lot from dowry paid by sons inlaws since they had their share in it. Also, women discredited others whose dowry had not been paid. They also ridiculed their husbands who had not paid dowry for them. In case a man was not able to pay dowry, his wife was eventually taken away from him and given to another one who could afford to pay. These female related customary

activities encouraged cattle raids because the cow is the only 'currency' used to pay for the services. Seers also contributed to conflicts through promising successful raids once they prayed for the raiders. They also benefited from raids by being given some of the animals stolen in return for their prayers.

Animals obtained through raids were distributed according to: responsibilities in the community, age and number raided. The remaining animals were scabbled for.

5.2.3.2 *Peace initiatives structures on the ground*

PRA results indicated that there are peace initiative structures on the ground. These included:

(i) Traditional systems for conflict resolution

After raids and other related conflicts, elders from the affected communities usually start negotiations. These are prominent opinion leaders in each community who deal with conflicts. However, interviewees reported that these traditional systems were not achieving much.

(ii) Disarmament-An operation done by the government

This was also reported as not achieving much.

(iii) Interventions by Non Governmental Organizations

There had been various interventions by NGO's on peace in the two districts whose approaches differ. Many different strategies had been used to communicate peace

by NGOs and other organizations: peace choirs, peace games, peace rallies, face to face dialogues, and women groups. Only a few of the initiatives were still operational by the time of the study.

Most of the interventions were not effective. Of the 160 households interviewed in both Districts, 20 (12.3%) said that the interventions had been effective whereas the remaining 138 (85.2%) said that the interventions had not been effective. Constraints to peace interventions reported by interviewees and peace initiatives implementers included the following:

- Operation areas being too large to cover effectively
- Lack of coordination amongst peace crusaders leading to lack of pooling of resources
- NGOs being often driven by demands of the development partners rather than the primary stakeholders
- NGOs targeting people who are actually not involved in conflicts for
Pastoralists reported that peace related meetings were usually held in big hotels where the pastoralists, and especially women, foreseers, and the raiders in particular would never access
- The communities not sensitized enough to a need level
- Vital roles played by women in conflict causation-singing of praises to war warriors, demand for high dowries, nagging their husbands to acquire more livestock, and high female circumcision costs overlooked by peace crusaders
- Lack of awareness
- Poor infrastructure
- Socio-cultural believes

5.3 INFORMATION ON ANIMAL HEALTHCARE SERVICE DELIVERY

5.3.1 Status of animal Health service delivery in West Pokot and Turkana districts

Quality controlled animal health service delivery that requires that veterinarians, either private or public, are the principal agents in directing the service delivery system and providing a lead role in technical guidance, coordination, supervision and monitoring was missing in the two districts. Instead, by the time of this study, providers of livestock services at the herder level were found to be diverse and were characterized by the presence of self-treatments, provision of animal health services by CAHWs and, NGOs, veterinary professionals, and private formal and informal sellers of drugs and vaccines. Supervision networks by veterinarians were weak and poorly resourced. Although the roles of the various players in animal health service delivery in the two districts (Government, NGOs, Associations, CAHWs, drug suppliers and livestock keepers) were defined to a large extent, in practice these players did not adhere to their roles. This was attributed partly to inadequate coordination and control of these animal health service deliverers.

Disease reporting system in the two Districts was found to be clearly defined but mechanisms to ensure adherence were found to be weak. CAHWs provided a useful link between the livestock keepers and the district veterinary authority in terms of disease reporting and surveillance but as a whole, there was no motivation for them to submit reports, nor were there any tangible compelling mechanism in place to make them accountable. Moreover, there was concern among veterinarians and

veterinary professional bodies at the apparent lack of supervision, regulation and prospects for CAHWs' sustainability.

Besides the modes of animal health service delivery systems discussed above, herders in the two districts were found to possess sound and effective indigenous knowledge about the management of their herds. This is in agreement with results of a survey study conducted on the ethno veterinary knowledge of the Maasai of Kenya that showed that the pastoralists have indigenous veterinary knowledge and that they rely not only on symptoms of diseases but also on vectors of diseases, season effects and species affected by a particular malady. Reconsideration of this indigenous knowledge and information systems could provide a basis for further livestock research and could serve future livestock extension programs tailored to their special circumstances.

Besides, using indigenous knowledge could also lead to increased participation of pastoralists in pastoral development projects and could be a starting point for supporting grass roots institutions such as herder's associations and groups that can back up technical and social interventions (Fre, 1992). Discussions with the Director of Veterinary services (DVS) and the District Veterinary Officers (DVOs) revealed that the direction the veterinary department was taking was to train pastoralists through pastoral field schools to enable them to participate in participatory disease search and this was already achieving a lot, especially in the search for HPAI. Majority of the herders interviewed, 120/160 (62%) supported farmer training. According to the DVS, there were success stories in farmer training in both the crop and livestock world. A lot of work has been done in Uganda by Agency for Technical Cooperation and

ment (ACTED) (2009). ACTED pioneers the use of Community traders as a local linking mechanism to help drought-afflicted agro-pastoralists in Karamoja (Uganda) and Pokot (Kenya) get their livestock to market. These. The roles of Community Trade Facilitators (CFTs) vary between the various locations in Karamoja and Pokot. In Kasei division of West Pokot, the three (3) CFTs help members of the local pastoral field school (PFS) get animals to market. The training curriculum for the farmers include training on communication, coordination, quality control procedures, meat and livestock trade policies, business skills and marketing and negotiation techniques.

Local communities are also on the front line of drought preparedness and management as they are able to pick up on many of the early signs of impending dry spells. ACTED is helping communities share this information across the Karamoja region by developing a harmonized system for data collection and dissemination across Karamoja's five districts. An interview with Vétérinaires Sans Frontières (VSF) Germany revealed that farmer training is also working in Ethiopia, Kenya and Uganda for crop work and livestock in both the high potential areas and ASALs. These experiences have shown that farmer training is acceptable by livestock owners, and since in the Veterinary act, the farmer is legally allowed to treat his/her livestock/animals, empowering livestock owners is more legally acceptable. However, their duties should be limited to participatory disease search and disease reporting.

5.3.1.1 *Livestock diseases*

During a pairwise ranking technique in Turkana District, diseases in the region were reported and ranked as follows: Trypanosomiasis, Mange (Simbrion), Eye infections

(s), Blackquarter, Heartwater (Chemley/ Chepirpirmot), Contagious Bovine Pleuropneumonia (CBPP) (Lookoi), Rinderpest (Molei), East Coast Fever (ECF) (Lokit), Rift Valley Fever (RVF), Foot and Mouth Disease (Ngorion), Pestes des petits Ruminants (PPR), tick infestation (Tiles) and in order of prevalence. PPR menace in Pokot was more pronounced in areas bordering Turkana district. Other diseases affecting livestock reported included Trypanosomiasis, tick borne diseases and worm infestation in that order.

Although it was found in this study that there are integrated National action plans for diseases such as Avian Influenza (HPAI), other important diseases such as Rift Valley fever and PPR, that are of high importance to the ASALs are not catered for in the plans. Subsequently, besides, reaction or response time to such outbreaks by the relevant authorities is usually prolonged. Discussions with the District Veterinary Officers revealed that the epidemiosurveillance systems were weak and this was mainly attributed to inadequate human and financial resources. Besides, in case of zoonotic diseases such as RVF, development partners would not be involved in surveillance until the first human case has been reported, and they may never respond at all in case of non zoonotic diseases such as PPR.

Economic studies have shown that cost of disease prevention is cheaper than cost of disease control in the long run (Tambi et al., 2006). In this relation, the Government and other stakeholders should use the Avian Influenza structures in place (emergency preparedness contingency plans) for control of other emerging and re-emerging epizootic diseases such as the RVF and PPR. This suggestion needs to be adopted and incorporated into the policy frameworks supported at the highest level

istry of Livestock headquarters. Incorporation of diseases in this manner outside world more insight to the country's veterinary system, creating by which leads to investor/partner confidence. Moreover, since there is no information showing how much is lost due to diseases, socio-economic studies be done to produce convincing data to policy makers and partners, clearly the long term impacts of the diseases on livelihoods.

country ensures quality and safety of animal production inputs and products, through the national laboratories at Embakasi and Kabete. However, the operations of these institutions are currently limited by the prevailing status of laboratory infrastructure and weak staffing levels. It was also observed that there was limited participation and collaboration between public and private laboratories.

Disease reporting systems are very key when the annual disease dossier is being reviewed by the OIE. However, it was found in this report that livestock owners were reluctant to report diseases to the animal health service providers as they feared that the authorities would slap a movement ban which is usually detrimental to live animal and meat trade. Other major losses to disease poor control effectiveness in recent years have been due to the decline through under-resourcing of veterinary diagnostic services and the slow development of alternative ways of providing reliable diagnostic capability. This situation can have serious effects on the spread and effectiveness of the national response to an emerging disease threat.

In poor countries like Kenya communities have little or no opportunity to enter the international market for animals and animal products and are struggling to enter and maintain markets at regional level, because they do not meet expectations for veterinary services or disease status. There is need for a long term strategy to build marketing opportunities for poor countries, without putting other countries at risk (Carlos, 2007).

5.3.1.2 *Constraints to access of veterinary services*

Lack of infrastructure was reported as the greatest problem affecting access to veterinary drugs and other services in 62/160 (38%) of the households; 60/160 (37.5%) reported lack of funds as the main problem; whereas the remaining 38/160 (23.75%) reported lack of animal health service deliverers as the main constraint. Other constraints reported included insecurity and human diseases.

5.3.1.3 *Frequency of purchasing veterinary medicine*

Of the 160 households interviewed in both districts, 86 (46.7%) bought veterinary drugs every month; 56/160 (30.4%) bought only when animal were sick; 12/160 (7%) bought every week; 6 (3.3%) bought once in years; and the remaining 14 (9%) never bought veterinary drugs. Veterinary drugs were purchased from local agro-vets or from CAHWs in open markets (personal observation).

5.4.1.4 Various modes of veterinary service delivery In West Pokot and Turkana Districts

The human resources available West Pokot and Turkana districts in 2006 are shown in table 14.

Table 14: Human resources available in West Pokot and Turkana District in year 2006

District	Veterinarians	AHAs	Livestock officers	CAHWs
Turkana	4	4	0	140
West Pokot	5	15	2	144
TOTAL	9	19	2	284

Considering the vastness, poor infrastructure, communication barriers and other challenges in the operating environment, the government staffing level was found to be inadequate in terms of numbers and experience. The shortage of veterinary infrastructure was an indication of the inadequacy of animal health services in the region.

One way of increasing veterinarians density as well as reducing farmers' travel distances would be achieved through contracting services by the government to private veterinarians (Turkson, 2009), allowing state employed veterinarians to engage in private practice (Leonard, 1999), or through employing more veterinarians.

In this study, the distribution of paraprofessionals and CAHWs was found to exceed that of veterinarians in the two districts. This is consistent with the findings of de Haan and Bekure (1991), Leonard (1993), Leonard *et al.*, (1999), and Oruko *et al.*, (2000), who also reported that the distribution of paraprofessionals exceeded that of veterinarians in any small holder farms. Paraprofessionals (in this case AHAs) live closer with pastoral communities and would therefore be more accessible to herders than veterinarians. However, they are also few in numbers and are only allowed to deliver a limited range of services. Moreover, legislation presently creates entry barriers to their participation in private practice. One way to utilize their services potential more effectively is increase their numbers through training and also develop their interface with veterinarians as a way of increasing penetration into pastoral communities and improving service quality. Official recognition of AHAs in the veterinary surgeons act would enhance the process.

Veterinarians would have their clinics in identified locations and support paravets in the more remote areas, where they would visit and supply paravets with drugs and attend to any cases that require expertise. Such market systems would also minimize transaction costs associated with service quality through the supervising role of veterinarians. The state would, therefore, need to carefully re-define the role and functions of paravets, this is already happening in Senegal (Leonard, 2000). By the time of the study, AHAs had already registered an association, the Kenya Association of Livestock Technicians (KALTs). This body would also be strengthened to offer guidelines for the scope of practice of paravets, oversee their registration and

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provide the necessary veterinarian-paravet networks through the veterinary professional bodies.

(i) Service delivery by the District Veterinary services (Public sector)

The Director of the veterinary department, under the ministry of livestock has the mandate of being the primary provider of veterinary services in Kenya. The core services of the Department is to provide public goods including selected clinical services, quality assurance of veterinary inputs (drugs and vaccines), vaccinations of economically and socially important animal diseases, disease surveillance and veterinary extension and advisory services. The public sector services are occasionally supported by selected NGOs, CAHWs, and the livestock keepers themselves, who provide some of the animal health services and inputs.

In principle, the District Veterinary plays a regulatory role to other Animal Health Service deliverers; however, by the time of this study, the District Veterinary Services were weak and thin on ground with the majority of government staff based at the district headquarters. The DVOs' offices were under-resourced, often requiring staffing and transport reinforcements when specific delivery tasks were to be implemented. Government disease control was done on NGO facilitation but only in accessible areas. Remote areas with poor road infrastructure were not covered.

At the same time, NGOs were supporting the establishment of community animal health service delivery system with limited prospects for sustainability, which only served to weaken animal health service delivery to herders.

Study data indicated that in the last one year preceding the interviews, no interviewee from either district had had his animals vaccinated against any of the common economically and socially important animal diseases and none had received extension services from the government veterinarians and animal health technicians. Main constraints affecting delivery of veterinary services by the district veterinary office reported by the DVO included:

- Limited resources (human and financial)
- An aging veterinary department (average staff 49 years old)
- Limited facilities and equipment
- Inadequate resource allocation for operations/budgetary constraint
- Low staff morale/lack of incentive
- Weak coordination and monitoring
- Inadequate records keeping and data management
- Weak linkages between the various AHSDs on the ground

Whereas the Department of Veterinary Services, plays a major role in disease control and surveillance (Animal health disease Act, CAP 364), it was found out in this study that it does not have the capacity, both physical and financial, to do so. Adequate vaccination coverage of livestock against diseases is one of the key animal disease control measures that ensure that livestock have the required protective herd immunity to prevent outbreaks and spread of diseases. As a result of inadequate funding for disease control by the government, the vaccination coverage for economically important diseases including foot and mouth disease, Contagious Bovine Pleural Pneumonia and PPR in Turkana and West Pokot districts, as in the

other ASALS of Kenya, have been extremely low and irregular resulting in recurrent animal disease outbreaks and subsequent rapid spread of these diseases.

Transaction costs related to animal health services have been specifically identified before as a constraint relevant to state delivered services (Leonard 1993, 2000; Leonard *et al.*, 1999). This creates disincentives and distortions for government veterinarians, and consequently reduces efficiency of service provision. The scenario in West Pokot and Turkana districts is reflective of the situation, not only in the country, but in many countries in the region and the rest of Africa. Growing budget restrictions in many countries have meant that official veterinary services cannot assume responsibility for existing and new activities. The natural reaction is to turn to private veterinary services to provide the support needed to strengthen the surveillance of priority diseases and thereby support the development of the livestock sector and the establishment of safe international trade. In this context, official veterinary services must work together with private veterinarians, outsourcing various technical animal health activities, so that they may focus their efforts on those tasks that cannot be delegated: standardization, control, auditing, general system coordination, epidemiological surveillance, and organizing veterinary policy in order to make best use of budget resources. For these relations to be efficient, a dynamic, two-way epidemiological mechanism must be created, whereby private veterinarians periodically keep governments informed, on the basis of an agreed methodology. Moreover, the official veterinary services must systematically transmit information on diseases to the OIE (World Organization for Animal Health). To fulfill this obligation there is need for the public and private veterinary services to establish functional

relationship to provide the livestock sector with the health and hygiene conditions that are necessary for effective disease control, which in turn provides greater security for international trade and increased consumer protection (Moural, Bedoya and Agudelo, 2004).

(ii) *Service delivery by Community Animal Health Workers*

a Approaches to CAHWs

The community animal health worker system, supported by NGOs was the main mode of service delivery, with poor prospects for sustainability should the support by the facilitating agents come to an end. The approaches of CAHWs programs in the districts included the following:-

(i) NGO-CAHW-Farmer: In this approach, an NGO trains CAHWs and issues them with an initial drug kit, which may be, or may not be cost shared. The CAHWs are subsequently "equipped" to treat animals for a fee. Most of the programmes in the districts of interest fell under this category.

(ii) NGO-Private Veterinarian-AHA-CAHW-Farmer: There was only one program of this arrangement in West Pokot District, and which was actually the only one of the kind in the country.

(iii) NGO-AHA-CAHW-Farmer: In this approach, the NGO had either a veterinarian or an AHT who supervised the CAHWs.

(b) Selection of CAHWs

During selection of CAHWs trainees, the facilitating agents introduced the concept to the district administration, followed by discussions with the community leaders who eventually took the lead role in selecting the trainees. The facilitating organizations provided the necessary guidance. Selection criteria included trust, respect, hard working, ability to read and write, and community member owning livestock. Women were rarely considered nor did they participate in the selection process. Table 12 shows levels of education of CAHWs.

(c) Training of CAHWs

Training was normally conducted by resource persons from the public or private sector or organization funding the programme. By the time of the study, the Kenya Veterinary Board (KVB) had developed training guidelines, referred to as “the minimum standards and guideline for design and establishment of Community-Based Animal Health workers System” (KVB, 2004). The process of harmonizing the standards and rationalizing the training was however, dogged in controversy and in the end no mechanisms were put in place to ensure adherence to these guidelines. In principle the CAHWs are provided with starter kits containing essential drugs and basic equipment at the end of training and are expected to replenish the kits as and when necessary. Table 15 shows levels of education of CAHWs in West Pokot and Turkana districts.

(d) Number of CAHWs trained in West Pokot and Turkana Districts

By the time of the study, a total 144 CAHWs had been trained by different organizations in West Pokot District, out of which only 30 were active, reflecting a drop out of 80%. In Turkana District, 140 CAHWs were trained, out which 30 were active, reflecting a drop out of 78%.

Table 15: Levels of education of CAHWs in West Pokot and Turkana districts

Level of education	Number out of 60	Percentage
Secondary education	34	56.6
Primary education	10	16.6
Adult	6	10.0
Illiterate	10	16.6
TOTAL	60	100

The high drop out rate was indicative of the instability and unsustainable nature of the CAHW animal health service delivery system. The reasons given by the District Veterinary Officers (DVOs) for CAHWs drop out included:

- Lack of interest and self drive
- Other lucrative business opportunities
- Inability to replenish drugs kits
- Inadequate follow up
- Wrong selection.

In terms of business diversification, 27/30 (90%) of the CAHWs were involved in other businesses other than animal health delivery and, 28/30 (93%) of them were involved in other community development activities. And concerning their returns, only 1/30 (3.3%) of CAHW interviewed reported that he made enough returns from the practice to sustain his family. Table 16 shows main practices by CAHWs were mainly engaged, and table 17 accessibility of CAHWs to other animal health service providers and veterinary drug shops in West Pokot and Turkana districts.

Table 16: Main practices by CAHWs in West Pokot and Turkana districts in 2006

Main practice	Number	out of	Percentage
	60		
CAHWs mainly selling drugs	44		73.3
CAHWS mainly treating	2		3.3
CAHWs doing both treatment and selling of drugs in equal proportions	14		23.3
TOTAL	60		100

(f) Constraints facing CAHWs

During focus group discussions, CAHWs reported that during dry season migration, there was a high demand for trypanosomiasis drugs. This is because, during this

season, livestock is taken near rivers and the highlands where tsetse flies are prevalent. East Coast Fever (ECF) was also reported to be very common at the highlands. It was, however, reported that routine aspect of deworming animals was not known and demand for dewormers was low.

The CAHWs were supposed to follow up herders during migration. They were supposed to carry enough drugs with them. However, this was not possible due to low purchasing power of drugs and lack of transport. Pastoralists also did not pay for services, they only paid for drugs and service charge was not included in the cost of drugs. Moreover, some herders paid for drugs in kind. This aggravated the CAHWs situation because there were no ready markets for the animals.

There was competition from free supply of drugs by some NGOs. In Turkana District for example, ICRC gave drug vouchers to livestock owners. They took the vouchers to drug shops where they obtained drugs and other goods and ICRC compensated the shop owner. Herders preferred this to buying drugs from CAHWs. Other forms of emergency delivery systems included systems where NGOs bought drugs from pharmacies and either gave them for free to herders or sold to them at subsidized prices during droughts. This created a lot of dependency on the part of herders who were not willing to buy drugs at full cost after the relief and thus affected their (CAHWs) business.

Constraints facing CAHWs reported by the DVOs by the time of the study included the following:

- Heavy dependency on facilitating agents leading to low purchasing power of pastoralists
- Lack of or weak supportive drugs supply system
- Inadequate policies
- Low livestock productivity and wrong attitude of pastoralists who do not view livestock as an economic unit.
- No clear exit plans by the facilitating agents-sustainability hanged on the balance
- Knowledge gaps-limited knowledge on drugs and drugs administration; and sampling especially collection of blood samples

Table 17: Accessibility of CAHWs to other animal health service providers and veterinary drug shops in West Pokot and Turkana Districts

Distance to the nearest veterinarian, or veterinary drug shop (km)	Number	Percentage
10-20 km	22	36.6
21-50 km	10	16.6
51-100 km	22	36.6
101-150 km	2	3.3
> 150 km	4	6.6
TOTAL	60	100

- Inadequate harmonized or systematic approach to refresher courses
- Limited or lack of opportunities for sharing information and experiences
- Poor supervision and monitoring
- Weak linkage with district veterinary office
- Competition from livestock owners who kept their own drugs or used traditional medication
- Competition from drug peddlers who supplied cheaper but low quality Drugs
- Poor motivation or obligation to report diseases
- Low volumes of operating inputs/drugs
- High transaction costs
- Droughts leading to free drugs intervention by various organizations

Community animal healthcare workers were not prominently present in the two districts. First, even in districts that had numerous training programmes for CAHWs, many were not active. Focus groups held with CAHWs revealed a number of causes for poor performance as listed below:

- Group members believed that training programs were often too fragmented and that community-level support was poor.
- Most of the CAHWs interviewed had undergone three one-week training courses over a short period of time (21 days).
- Many CAHWs complained that the long time period between trainings made it difficult to retain taught material.

- Some suffered from demands from friends and relatives to receive free livestock drugs. Once trained and given kits, most CAHWs felt under pressure to assist friends and relatives in need thereby leaving them without the capital to replenish their drug supply.
- There were problems in targeting appropriate candidates for training. Although the communities chose CAHWs, the focus groups stated that the process often results in highly politicized choices.
- Lack of recognition by the government.
- Lack of collaboration and co-ordination among CAHWs' projects and programmes

These findings are in agreement with those of Oakeley (1999), who reported that the sustainability of Community animal health workers programs is often questionable. Based on the present finding this could be partly due to the lack of objectively verifiable outcomes, especially in areas that are difficult to access and over dependence on the NGOs funding them. In addition, the government veterinary services in the target districts were not usually actively involved in their implementation and so they had little control and thus did not own up the process and product (CAHWs). Besides, at present there is no policy or legal framework in the structure of an animal health care system defining and setting out the relationship between the CAHWs, the paraprofessionals (AHAs), and the veterinarians. The role of the CAHWs and paraprofessionals within the structure of animal health care is not clearly defined except in public sector institutions, and there is no clear agreement on minimal training requirements.

The current veterinary surgeons act does not prohibit the farmer from treating his own animals. The structures already put in place for training CAHWs could, therefore, be strengthened and geared towards training farmers but for purposes of doing participatory disease search and managing minor cases such as deworming.

(iii) Drug delivery systems in West Pokot and Turkana Districts

The Government stopped providing veterinary drugs in West Pokot District over 10 years ago. According to the findings of the present study there was only one veterinary drug store and two chemists in the district. CAHWs were seen in the markets selling both human and veterinary drugs, which were of questionable quality. This finding is consistent with earlier findings of a study done in Kenya on drug supply which reported that 9/21 anthelmintics obtained from local pharmacies and merchants did not contain any active ingredient (Monteiro, Wanyangu, Kariuki, Bain, Jacson and Mckeller 1998).

In comparison by the time of this study, over 70% of drugs in Turkana district were provided by the private sector, as the Government had also stopped providing veterinary drugs over 10 years ago. According to the DVO, NGOs and other development agencies provided the remaining 30%. In the district, there were eight (8) drug stores in the central district run by the locals who purchased their supplies through the Arid Lands programme of the Office of the President. However, by the time of this study, the system was collapsing. In the North of Turkana VSF-Belgium had started a total of 4 drug shops in the central region, which were later handed over to the AHAs. By the time of the study, the AHAs supplied drugs to the CAHWs who in return supplied to the herders.

ITDG had also started two drug stores to north and had also left them to the locals to run. However, by the time of this study, these too were also collapsing, leaving the herders with no other choice but to source for drugs from hawkers and other quacks – quality and medicinal value of such drugs was highly questionable.

In Lodwar town, there were two (2) chemists that sold veterinary drugs and chemicals. In summary, distribution of veterinary drugs in the district by the time of this study included: eight (8) shops run by livestock associations, two (2) shops run by ITDG, four (4) shops run by VSF-Belgium, and two (2) chemist shops located in Lodwar town.

Given the generally low education and awareness levels of poor livestock producers in developing countries, herders are often exploited. The inability of service users to distinguish low and high quality providers can significantly impair market efficiency. To prevent this, there is need for the government in partnership with other strong institutions, including veterinary input producers and formal marketing agents and professional veterinarian associations, for regulating behaviour, enforcing ethics, disseminating information and providing an effective regulatory and legal framework.

(iii) Community Participation in animal health service delivery

Pastoralists in West Pokot and Turkana Districts were found to have a great wealth of indigenous knowledge, which they applied effectively to raise livestock. In the two

Districts, there were many different traditional healing practises, ethno-veterinary practices, designed to cure, control or prevent human and/or livestock diseases. While practicing ethno-veterinary medicine pastoralists relied not only on symptoms of diseases but also on vectors of diseases, season effects and species affected by a particular malady (Munyua *et al.*, 1998).

These findings are with earlier reports that farmers are a rich resource of practical agricultural knowledge (FAO, 2007). Traditional communities who are almost entirely dependent on agriculture have a wealth knowledge concerning breeds, production methods and disease. The extent of knowledge on a particular agricultural activity is usually related to the degree of economic dependence a society has on that activity. Concerning livestock, pastoral and agro-pastoral systems with a large component of animal husbandry are the best source of traditional livestock knowledge. In fact, community knowledge related to animal health has been termed 'existing veterinary knowledge'.

Existing veterinary and medical knowledge has made important contributions to western medicine. For example, it was the Maasai who suggested that the wildebeest was associated with the epidemiology of malignant catarrhal fever (MCF) (Barnard, Van Derlugt and Mush, 1994). In regard to rinderpest, Plowright (1998) has indicated that 'nomadic cattle owners could give uninitiated professional a firm diagnosis of rinderpest and even husbanded mild strains purposely to immunise their stock'. Livestock owners provided the clue that led to the recognition of the first insect vector in the transmission of disease. Kilborne's famous experiments on tick transmission of bovine babesiosis conducted in 1889-92 were based on the cattle

owners' hypotheses is that ticks caused the disease. Indigenous knowledge has been associated with major paradigms shifts in the development of modern disease ecology-in these examples, the discovery of insect vectors and Sylvatic cycles of disease transmission (Schwabe, 1984).

The recent development of participatory techniques in disease search has been hand-in-hand with the advancement of the concept of community empowerment. Over the few decades, collection of existing veterinary knowledge through surveys has become an important method for the identification and prioritization of animal health problems within pastoral communities (McCorkle and Mathias-Mundy 1992). A number of times, this ethnoveterinary surveys have been carried out as part of a baseline study for an animal health project. In fact, more recently the use of rapid rural appraisal (RRA) or participatory rural appraisal (PRA) techniques as a general project design and monitoring tool have been shown to be a timely, accurate, and cost-effective means of collecting essential information for project formulation (Marriner *et al.*, 2000).

Further empowerment of farmers through training to be able to treat their own animals could be based on existing structures and experiences such as the existing ethno-veterinary knowledge, existing PRA and PDS tools, as well as the goodwill and structures already in place for the training of CAHWs.

(iv) Private sector service delivery

By the time of the study, private sector was extremely limited and generally under-developed, and consisted principally of retail drugs shops, pharmacies and unlicensed drug vendors. There was only one private veterinary practice, located in West Pokot District, whose activity was largely limited to the sale of drugs. The livestock keepers, sourcing drugs from various sources including inferior and fake drugs from unqualified persons, were also providing curative services mainly for their own animals.

The challenging environment to privatization in the two districts included long distances between centers, poor infrastructure, prolonged droughts, limited communications, insecurity, high service delivery costs and frequent movement of the community and their livestock, and non linkage of the private sector with main stream animal health service providers.

Privatization of animal healthcare has been promoted all over the world to improve efficiency and effectiveness of services, on the assumption that private sector organizations are more flexible, and that competition between providers will drive prices down. Early experiences indicate that in remote areas where many poor livestock keepers live, there are often neither public nor private veterinarians. Given that the target communities are too poor to pay much for animal health care and tend to be remote or inaccessible, the delivery of veterinary services raises particular problems. Especially in extensive areas, it is usually uneconomical for them to use veterinarians on a routine basis. Veterinarians are unwilling to establish themselves in such un-lucrative practices, and travel expenses are often too high for them to

make regular visits (Okwiri *et al.*, 2001). As a result, privatization seems to be working only in areas with co-economies of cash crop such as tea and coffee, which contributes to the stability of the family's economy.

The results of this study are in agreement with observations by Le Brun (2004) who reported that in developing countries, there is an emergence of a private sector designed to remedy the shortcomings of the public sector, whose presence in the field has been severely limited by the budget restrictions of the past twenty-five years. In February, 2003, the OIE also set up an *Ad hoc* group with the task of studying the role of private sector veterinarians and para-professionals in the provision of animal health services. The *Ad hoc* group recommended that, in order to strengthen animal health and veterinary public health services through improved involvement of private veterinarians and para-professionals, veterinary administration should build official links with service providers. The group further recommended that links between veterinary administrators and private veterinarians take the form of contracts for the provision of specific services such as disease monitoring and surveillance, annual vaccination, food inspection and disease prevention and control.

In several European countries (United Kingdom, Germany, Netherlands, Italy, Poland, France, and Lithuania), all private veterinarians are involved in official healthy policy activities to a greater degree (Le Brun, 2004). In these countries, private veterinarians sign contracts with the government for epidemiological surveillance; monitoring the health of animals and the quality and safety of the procedures for selling and processing animal and animal products; and meat inspection activities.

In France, for example, an animal health accreditation mandate is a renewable mandate which the government confers on private veterinarian to carry out health policy tasks. The animal health accreditation mandate is assigned by degree. When the private veterinarian, known as a 'veterinarian with an animal health accreditation mandate' fulfils these tasks, he or she is considered to be an official veterinarian (in the sense of Terrestrial Animal Health Code), invested with the official authority of a public official, with the responsibilities and protection attached to this position.

A number of African countries have implemented the animal health accreditation mandate in the past ten years, primarily under the impetus of the Pan African Rinderpest Campaign (PARC). The first one to do so was Niger, followed by Chad (Le Brun, 2004). In Niger, private veterinarians vaccinated against Rinderpest and CBPP. The set target of vaccinating 80% of the estimated one million cattle in border areas was not only achieved, but exceeded. Subsequently, Guinea Conakry, Senegal, Cote D'Ivoire, Mali and Burkina Faso all successfully embarked on the same experience. A discussion with the Chief Veterinary Officer, Kenya revealed that the country also embarked on the same, and vaccination coverage of 80% was achieved.

Generally, the Kenya government is constrained by both low numbers of skilled personnel in its employment and limited support facilities, a situation that impedes capability to monitor the prevalence of disease and pests in the country. The results of this study indicate that quality veterinary services in Turkana and West Pokot Districts are practically inaccessible, and heavily understaffed as far as veterinary

personnel are concerned and this situation is reflective of other ASALs. Despite the fact that the Veterinary Surgeons Act, CAP 366 provides for veterinary practices to be conducted by qualified and registered veterinarians, the results of this study indicate that CAHWs bought drugs from quacks and sold them in open markets, leading to the presence of a lot of illegal and unethical handling of veterinary drugs.

Generally, pastoralists are known to employ a dual approach involving both modern and ethno-veterinary medicine to combat diseases that attack their livestock. However, recently, the pastoralists are increasingly depending on modern veterinary inputs such as Tetracycline, acaricides, and a large variety of antihelmintics (Miaron, 2004). As the Veterinary Surgeons Act does not prohibit the farmer from treating his own animals, the herders need the knowledge to make decisions about livestock health and the skills to provide basic health care to their animals. However, farmers, who treated their own livestock using ethical drugs such as Tetracycline, did not address the new sanitary demands, and in any case contributed to problem of drug residues. The Pharmacy and Poisons Act, CAP 244 is partly to blame for this. This act is a constraint to animal health service delivery in two ways:

- (i) Under the act, veterinarians can only possess drugs for the purpose of legitimate veterinary treatment. Whether registered or not, veterinarians are not allowed to carry out business of veterinary drugs stockiest. Instead, pharmacists, who are mainly trained to handle human drugs, are allowed to do it.
- (ii) The act does not incorporate veterinarians in drugs inspectorate services. This is considered one of the reasons leading to abuse and misuse of veterinary drugs in the field, for there is little respect for ethical practices in dispensation of

veterinary drugs by many pharmacists and yet the drugs inspectorate service is not keen to rectify the situation. The pharmacists are handling drugs that are not just theirs and as a result, the pastoral activity of these populations is thus in danger of being more and more marginalized. The future of these populations could be reduced to self-consumption of their ruined pastoral production and to the unsustainable income from humanitarian aid.

It was observed in this study that the veterinary services and animal health service delivery in general operate under a number of acts of parliament that were developed by the colonial government for an era past. These Acts have not been revised to better reflect the prevailing social, economic and political realities and to respond to emerging challenges and needs and are, therefore, wanting in certain ways. Besides review and amendments, the other bottleneck is the inadequate enforcement and compliance by various actors. As a result, the ASALs of Kenya do not have an efficient animal health service delivery system.

Given all the above findings, it was concluded that the uptake of veterinary services by both official and unofficial channels was quite low. It appeared that for the majority of households, access to service provision consists mainly of the purchase of livestock drugs.

Common to both districts was the existence of gaps and deficiencies in AHSD for which substantial resources, manpower and a review of policy will be required to make good. In these districts the main service delivery gaps included deficiencies in skilled manpower; weak district veterinary service with inadequate equipment,

facilities and incentives; low level of community participation; underdeveloped private sector, weak linkages between AHSDs; and poor drugs supply system.

CHAPTER SIX

FACTORS INFLUENCING PASTORAL HOUSEHOLD LIVESTOCK-DEPENDENT INCOMES IN TURKANA AND WEST POKOT DISTRICTS

6.1 INTRODUCTION

This chapter describes the factors influencing pastoral household livestock dependent incomes in West Pokot and Turkana Districts. The factors tested include herd size, level of education of household head, household size, age of herder, availability of extension services, satisfaction with service, affordability of service, acceptability and accessibility of service, service demand, availability of credit, distances covered to the nearest animal health care facility, and choice of animal health service deliverer.

6.2 LEVEL OF PUBLIC SECTOR FUNDING TO THE LIVESTOCK SUB-SECTOR

It has been observed that since 1980s, the funding for the livestock sub-sector, and the agricultural sector in general, has been declining. Whereas the total agricultural sector used to receive 10% of the total government budget in the 1960s, the funding level decreased to 7.5% in the 1980s and to a dismal 3% in the 1990s. During the financial year 2005/2006, the entire agricultural sector received about 5-7% of the total budgetary allocation. Indeed, since the financial year 2002/2003, the total

agricultural sector budgetary allocation has been about 3% of the total government budget, with livestock budget accounting for only 1% of this proportion, which is equivalent to about 0.25% of the national GDP (Kenya fiscal year budget 2002/2003; 2003/2004; 2004/2005; 2005/2006). This is as opposed to the contribution of the livestock sub-sector to national GDP, currently estimated at about 10%. In the financial year 2008/2009, the agricultural sector received 4.5% of national budget against 7% in 2007/2008. In the financial year 2008/2009, the livestock sub-sector received Ksh 4.56 billion (0.6% of national budget) against a requirement of Ksh 10 billion (1.3%) of the budget (Ministry of Livestock Development, 2009). This included Ksh 800 for control of RVF, Ksh 420 million, for the control of PPR and Ksh 700 million for drought response. Budget for emergency interventions was Ksh 557 million. As a result of inadequate funding for disease control, the vaccinations coverage for diseases including foot and mouth, and Contagious Bovine Pleural Pneumonia in the ASALs of Kenya have been extremely low and irregular resulting in current status of frequent outbreaks and spread of these diseases.

6.3 WEST POKOT AND TURKANA DISTRICTS

6.3.1 Descriptive statistics

Table 18 shows a summary of explanatory variables affecting household income in West Pokot and Turkana District, and the recorded descriptive statistics.

Age of the herder: According to the survey, majority of the respondent herders' ages in both districts were in the age class of >46 years. There were more elderly herders (average age of the household age was greater than 46 years of age) than younger

ones. Contrary to the findings of this study, it was expected that the average age of the herder was changing with more young people taking full charge of households and providing herd management.

It was expected that close relationships between the young herders and livestock development projects and extension workers may create a relative decrease in self treatments, with more households tending to go for professional animal health services other than self and hence impacting positively on productivity.

While Shiferaw and Holden (1998) underscore the positive correlation between age and perception of problems in a farming system, Bellon and Taylor (1993) argue that older persons are less likely to engage in productive farming practices.

Household size: Results indicate that by the time of the study, the average household size was in West Pokot District was 9.89 whereas that of Pokot District was 7 adult equivalents. Since the number of people living in a household is a determinant of the household's availability for labour, it was expected that the bigger the size of the household, the higher the productivity and hence the household income.

The findings of this study indicate that the household size in West Pokot District is higher than the household size in Turkana District. The results concur with findings of

Henry (1999) who reported that the human population in the ASALs, particularly the more drought prone arid areas, has various patterns of concentration.

Table 18: A summary of explanatory variables affecting household income in West Pokot and Turkana Districts.

Variable	Unit definition	Average recorded	
		West Pokot	Turkana
Herd size	TLUs	39.34	90.3
Household Size	Adult equivalents	9.89	7
Age of household head	Scale 1-4: The larger the older	>46 (mode = 4)	>46 (mode = 4)
Level of education of Household head	Scale 1-4: The larger the more the education	Illiterate (mode = 1)	Illiterate (mode = 1)
Acceptability of service (satisfaction with service)	Scale 1-3 The lower the better	Not satisfied by available Service (mode = 3)	Very satisfied with service (mode = 1).
Accessibility to service (Distance to the nearest Veterinary service)	Scale 1-4 The fewer the kilometers the higher the accessibility	6-10 KM (mode = 2)	6-10 KM (mode = 2)
Availability of veterinary services (Hours taken by AHSD to respond to herder's call)	Scale 1-4 The higher the less available	Hours (mode = 1)	Hours (mode = 1)
Availability of extension Services	Binary 1 for yes 2 for No	80 do not herders access extension services	80 do not herders access extension services
Service demand (action taken when animals are sick)	Scale 1-6	5 Self treatment	

TLUs: Total livestock units

There is variability in population density from district to district, but this variability is most significant in certain localities. The density is very high where services (such as those provided by schools, markets, hospitals and relief centers or camps are available).

West Pokot District, and especially Kapenguria division, one of the study areas is an higher potential area than Turkana District, and it is more developed in terms of infrastructure. As a result, there are more settled communities in the district than in Turkana District. Reports show that fertility rates may be rising in the settled communities where the size of households is generally larger (Henry, 1999). Sindiga (1987) also reported that where development has been introduced in ASALs, there is a tendency for population to rise faster. The tendency for high family sizes in a settled community is linked, and perhaps, correctly to couples staying together longer now than before during the nomadic life. Rising population is also linked to improved life expectancy (ECA, 1998).

Most household heads were polygamous. A man with many wives reflected on his wealth because he could afford to pay dowry. A man with only one wife was referred to as 'Jicho moja' (one eyed) and was not allowed to address a baraza. Also, when a woman was newly married, she was given livestock to multiply. So, the more the wives, the more the animals. The incentive to give birth to many children was also attributed to coping mechanisms with high child mortality rates. Also, Sons do not leave the homestead (manyatta) even after marrying. Their property is also identified with the head of the household. This contributed a lot to the high household sizes.

Level of education of household head: Of the herders interviewed in West Pokot District, majority were illiterate, 67 (85%). A few had attained primary education, 10 (12.5%), and the minority, 3 (2.5%) had attained secondary education. In Turkana District, majority of the herders interviewed 66/80 (82.5%) were also illiterate, 2/80 (2.5%) had attained primary education, 9/80 (11.25%) had attained secondary education, and 3/80 (3.75%) had acquired tertiary training. The level of education attained by the head of a household influences access to information, decision making, income and consequently livelihood security of a household. Households headed by educated heads are less likely to be poor compared to those of uneducated heads. This is because educated heads have higher income earning potential and more alternative income earning opportunities, and are therefore better able to improve the quality of their respective households' welfare (Krishna et al., 2004; Mango *et al.*, 2004). Muyanga (2004) points out that education provides an opportunity for pastoral households to diversify their livelihood portfolios especially through employment as a source of wage and remittances.

Moreover, social distances, understood as differences in access to services due to educational variations between herders and the animal health service deliverers among other factors play an important limiting role in the choice of AHC service (Woods, 2000). Although it is expected that increase in prices as charged by professional veterinarians reduce demand, there could be startlingly high levels of use of more expensive health providers, even among those who cite a concern with price as one of the determinants of their choice (Leonard, 2000). This disparity in

access to education can be explained by the reason that pastoral communities lack access to social networks, education inclusive.

Gender of household age: In both districts, all households, 160 (100%) of the households were male headed. Because of cultural and religious norms, women are deprived of property ownership rights and given lower status in all of the pastoral communities. They are denied participation in traditional leadership and control of key assets, given marginal benefits from divorce and inheritances of common properties (Marinda and Heidhues, 2004). They are denied participation in traditional leadership and control of key assets, given marginal benefits from divorce and inheritance of common properties (Gritli, 1997; Emanu *et al.*, 2005). In all pastoral communities in Kenya, the head of the household, usually a male, owns most important physical and financial assets and is responsible for all important decisions concerning the use and management of household resources. Such rights are not readily transferable to women even in cases where they are rendered heads of households when their husbands are employed elsewhere or dead. This implies that women headed households are disadvantaged with regard to access to natural resources and decisions important in pursuance of sustainable livelihoods.

Satisfaction with veterinary services available: In West Pokot District, 6/80 (7.5%) of the interviewees were very satisfied with services available, 29/80 (36.3%) were just satisfied with the services, and the remaining 45/80 (56.3%) were not at all satisfied with services available. In Turkana District, more herders 38/80 (47.5%) were very satisfied with veterinary services available than in West Pokot District,

32/80 (40%) were just satisfied with the services, and the remaining 10/80 (12.5%) were not at all satisfied with services available. The results indicate that majority of the herders in West Pokot District were not satisfied with the animal health care services available (mainly CAHWS). Satisfaction with a service is a big incentive to using the same and normally leads to high productivity.

Given the target communities are too poor to pay much for animal health care and tend to be remote or inaccessible, the delivery of veterinary services raises particular problems especially in extensive areas. It is usually uneconomic for them to use professional veterinarians on a routine basis. Professionals on the other hand are unwilling to establish themselves in such unlucrative practices and travel expenses are often too high for them to make regular visits. On the other hand, herders in West Pokot District may have been more exposed and more aware of quality veterinary services and would not accept services by CAHWS. In Kapenguria division, there was a private veterinarian who was distributing veterinary drugs through AHAs to herders. Herders were also buying veterinary drugs directly from him and as such, herders would not have been satisfied with services by CAHWS when they had probably seen the advantages of getting quality services from a veterinarian.

Distance to either the nearest veterinary clinic or animal health service deliverer: Concerning distances covered by households to the nearest animal health service deliverer, in West Pokot District, 13/80 (16.3%) of the herders interviewed walked less than 5 km to the nearest veterinary clinic, 41/80 (51.3%) walked between 6-10 km, 18/80 (22.5%) walked between 11-15 km, and the remaining 8/80 (10%)

walked for more than 15 km to the nearest veterinary clinic. Of the 80 households included in the sample, none had used any veterinary services during the twelve months period immediately preceding the survey, and the same number cited the long distances to the nearest veterinary centre or animal health service deliverer.

In Turkana District, 62/80 (77.5%) of the herders interviewed walked less than 5 km to the nearest veterinary clinic, 2/80 (2.5%) walked between 11-15 km, and the remaining 16/80 (20%) walked for more than 15 km to the nearest animal health service deliverer. The distances covered by the household to the location of the veterinary clinics as well as the time taken to the service influence motivation for use of veterinary services. Since veterinary clinics were located on the main roads and in market centers, far away from the location of the households, household heads opted for self treatments other than services by animal health service deliverers. This compromised productivity.

Majority of herders in Turkana District covered shorter distances (> 5) to the nearest animal health service deliverer. On the contrary, in West Pokot District, majority of the herders covered longer distances (6-10 km) to the nearest animal health service deliverer. This difference in distances may have been attributed to the fact that there having been a private veterinary practice in West Pokot District (kapenguria), herders may have preferred walking longer distances to access quality veterinary drugs from the veterinarian whereas in Turkana District, herders walked shorter distances to CAHWs who lived in the communities.

Table 19 shows the average distances covered by herders to the nearest veterinary clinic in West Pokot and Turkana District in 2006.

Response time: Concerning time taken by an AHSD to respond to a herder's call whenever an animal was sick, in West Pokot District, 33/80 (41.3%) responded in hours, 27/80 (33.8%) responded in days, 9/80 (11.3%) responded in a week and the remaining 11/80 (13.8%) responded in more than a week's time.

In Turkana District, 24/80 (30%) of the interviewees said that the response was in hours, 23/80 (28.75%) said that the response took days, and the remaining 33/80 (47.75%) said that the response took more than a week's time.

Just like in West Pokot District, none of the 80 (100%) herders interviewed accessed extension services and also none of them afforded to pay for clinical services. Coordinated vaccinations for outbreaks of livestock diseases were lacking and only one of the interviewees had received vaccinations for his livestock during the last one year preceding the study.

An important factor contributing to the quality of animal health care is its availability and this availability is determined by the demand for, and supply of, services

(Van *et.al.*, 2008).

Table 19: Average distances covered by herders to the nearest veterinary Clinic and animal health service deliverers in west Pokot and Turkana District in 2006

Distance	Districts			
	West Pokot District		Turkana District	
	No.of households	Percentage	No.of households	Percentage
> 5	13	16.3	62	77.5
6-10	41	51.3	0	0.0
11-15	18	22.5	2	2.5
> 15	8	10.0	16	20.0
TOTAL	80	100	80	100

In this study area, animal health service deliverers, took, on average, longer than expected to respond to a herder's call leaving the herders with no other option but self treatments and this compromised productivity.

Extension services: Despite the presence of extension projects in the country, at the time of the study, only 18/80 (22.5%) of the herders interviewed accessed extension services. In incomplete animal health care markets meant that there were

information failures. This meant that herders were not aware of the health status of their animals and did not know all the options available to contribute to the improvement of their health. The herders did not know how much each of these options could contribute to enhance their animal's health and are able to evaluate the relative quality of each of these options. From a market economic perspective, customers of animal health services have limited knowledge and information on the available treatment/preventive options (Leonard, 1993, 2000). This information asymmetry as a result may result in adverse selection of a veterinary service. Results of this study indicate that there was adverse selection of AHC services and the providers of quality services could not be distinguished from providers of inferior quality or quality veterinary drugs could not be distinguished from substandard or counterfeit drugs, resulting in the household head preferring self treatments and hence compromising productivity.

Distance traveled by a herder and his livestock to the nearest veterinary clinic was measured in Kilometers. Distance was assigned 1 if less than 5 KM, 2 if between 6-10 KM, 3 if between 11-15 KM and 4 if greater than 15 KM.

Concerning accessibility to the nearest roads and markets, in West Pokot District, 56/80 (76.25%) of the households interviewed took less than 5 hours walking to the nearest roads and markets, 18/80 (22.5%) took 6-10 hours, and the remaining 5/80 (1.25%) took at least a day to walk to the nearest main road and market. On average, the distance to the nearest roads and markets stood between 6-10 km. Means to the main roads and local markets included walking, use of mechanized transport and bicycles. 51/80 (63.75%) of the respondents walked to main roads and markets,

28/80 (35%) used mechanized transport, and the remaining 1/80 (1.25%) used bicycles. None of the herders afforded to pay for clinical services. Coordinated vaccinations outbreaks of livestock diseases were lacking and non of the interviewees had received vaccinations for his livestock during the last one year preceding the study.

In Turkana District, 56/80 (70%) of the households interviewed took less than 5 hours walking to the nearest roads and markets, and the remaining 24/80, (30%) took at least a day to walk to the nearest main road and market. Just like in West Pokot District, on average, the distance to the nearest roads and markets stood between 6 and 10 km. Means to the main roads and local markets included walking, use of mechanized transport and bicycles. Of the 80 respondents, 72/80 (90%) walked to main roads and markets, 6/80 (7.5%) used mechanized transport , and the remaining 2/80 (2.5%) used bicycles.

Table 20 shows the average time taken by the AHSDs to respond to a herder's call in West Pokot and Turkana Districts.

Concerning the action taken by interviewees whenever their livestock were sick, results indicate that in West Pokot District, majority of the herders, 47/80 (58.8%) treated their own animals, 29/80 (36.3%) called an animal health service deliverer, and the remaining 4 (5%) resulted to slaughter. In Turkana District, 33/80

(41.25%) treated their own animals, 42/80 (52.8%) called an animal health service deliverer, and the remaining 5 (6.25%) resulted to slaughter.

Table 20: Average time taken by the animal health service deliverer to respond to a herder's call in West Pokot and Turkana Districts.

Time	District			
	West Pokot District		Turkana District	
	No. of households	Percentage	No. of households	Percentage
Hours	33	41.3	24	30
Days	27	33.8	23	28.8
Week	9	11.3	11	13
> week	11	13.8	22	28.2
TOTAL	80	100	80	100

The results indicate that majority of herders in West Pokot District treated their own animal whereas majority of herders in Turkana District called an animal health service deliverer. In West Pokot District, herders accessed quality drugs from the private veterinarian located at Kapenguria. They bought drugs and treated their own animals, whereas in Turkana District, most herders sought veterinary services from CAHWs who lived with them in the communities and hence the difference. Table 21

shows action taken by herders in West Pokot and Turkana Districts whenever their animals were sick.

Of the 80 households included in the sample in Turkana District, only one, 1/80 (1.25%) had used a public veterinary service (vaccination) during the twelve months period immediately preceding the survey. All the 80 households cited the long distances to the nearest veterinary center or animal health service deliverer as a disincentive for using the veterinary services.

Generally, the uptake of veterinary services in both districts was low. Across Turkana district, only 1/80 (1.25%) of the households utilized the government services, and those who obtained such services had benefited from vaccinations only. In West Pokot district, majority of the households were generally not cognizant that such services existed or even that the purpose of the government veterinarians was to treat animal diseases. The remainder of the study sample that were aware of the role and functions of the veterinary services were dissatisfied cited the lack of availability of staff.

6.4 RESULTS OF REGRESSION ANALYSIS

As already indicated, two models involving multiple regression analysis were tried using the base Equation (1). These were the ordinary least squares (OLS) and the weighted least squares (WLS). The latter is also generally referred to a generalized

squares (GLS) model. The exact regression procedures involved in the estimations of the models are as shown below:

Table 21: Action taken by herders in West Pokot and Turkana Districts whenever their animals were sick.

Action	District			
	West Pokot District		Turkana District	
	No. of Households	Percentage	No. of households	Percentage
Treat own animals	47	58.8	33	41.25
Called an animal health service deliverer	29	36.3	42	52.8
Slaughter	4	5	5	6.25
TOTAL	80	100	80	100

1. OLS: This involved the direct application of the base equation, where all the classical linear regression assumptions on the error term were assumed to hold.
2. WLS: When OLS regression analysis was done, the factors were looked at 5% significance level in both districts. In West Pokot District, none of the factors was significant at this level, but in Turkana District, only two factors were significant,

namely, acceptability of (satisfaction with) veterinary services available (CAHWS), and response time (time taken by an AHSD to respond to a herder's call). When the level of significance was raised to 10%, only response time became marginally significant in West Pokot District, whereas mode of service delivery became marginally significant in Turkana District.

Because of the low R^2 (coefficient of determination) in the OLS and the evidence of heteroscedasticity brought about by herd size, a form of weighting was applied to the data before running an OLS regression to obtain WLS parameters. An OLS was then run to obtain WLS and factors looked again at 5% and 10% levels of significance. The level of education of household head in both districts was significant at 5%, and in Turkana District, also significant at 5% were acceptability of animal health service available, and distance to the veterinary clinic. When the significance level was raised to 10%, in Turkana District, accessibility, response time and household size became marginally significant (at 10% level of significance) whereas in West Pokot District, only cost of service delivery per month became marginally significant. Tables 22 and 23 report the OLS and the WLS results for Turkana district.

Table 22: Factors influencing pastoral household livestock incomes: Ordinary Least Squares (OLS) Regression Coefficients^a for Turkana District using household income as the regressand.

Factor	β	T	Sig.
Level of education of household head	.024	.192	.848
Age of household head	.129	1.236	.221
Cost of service delivery per month	-.147	-1.449	.152
Accessibility	-.039	-.392	.696
Satisfaction	.042	.419	.676
Acceptability	.287	2.209**	.031
Distance to vet clinic	.123	.960	.340
Mode of delivery	.201	1.895*	.062
Response time	.318	2.696**	.009
Herd size (TLUs)	.162	1.535	.129

^aDependent variable: Monthly income level of herder (month)

**Significant at 5%; *Significant at 10%; $R^2 = 0.376$; Adj $R^2 = 0.276$;

F = 3.731**

Table 23: Factors influencing pastoral household livestock incomes: Weighted Least Squares (WLS) Regression Coefficients^{a,b} for Turkana District using household income as the regressand and herd size as the weighting variable

	β	T	Sig.
Level of education of household head	.334	3.816**	.000
Age of household head	.099	.900	.371
Cost of service delivery per month	.143	1.613	.112
Accessibility	-.159	-1.837*	.071
Satisfaction	-.110	-1.272	.208
Acceptability	.184	2.015**	.048
Distance to vet clinic	.431	3.620**	.001
Mode of delivery	.133	1.194	.237
Response time	.171	1.903*	.061
Household size	.181	1.689*	.096

*Dependent variable: Monthly income level of herder (month)

^aWeighted by herd size (TLUs)

**Significant at 5%; *Significant at 10%; $R^2 = 0.543$; Adj $R^2 = 0.475$;

$F = 7.963^{**}$

Tables 24 and 25 report the OLS and the WLS results for West Pokot district.

Table 24: Factors influencing pastoral household livestock incomes: Ordinary Least Squares (OLS) Regression Coefficients^a for West Pokot District using household income as the regressand .

Factor	β	T	Sig.
mode of delivery	.117	.991	.325
Household size	-.029	-.246	.807
Level of education of household head	.173	1.511	.135
Age of household head	.104	.879	.382
Cost of service delivery per month	.119	1.039	.303
Availability of extension services	-.139	-1.214	.229
Accessibility to service (Distance to the nearest road/markets)	-.184	-1.592	.116
Acceptability of service (satisfaction with service)	-.196	-1.686*	.096
Herd size (TLUs)	-.006	-.047	.962

^aDependent variable: Monthly income level of herder (month)

*Significant at 10)%; $R^2=0.167$; Adj $R^2=0.060$; $F=1.557$

6.5 HYPOTHESIS TESTING

Focusing on the WLS model which explains more than the OLS model by virtue of its R^2 value and F statistics, results indicate that in Turkana District, level of education, acceptability, and distance to the nearest veterinary clinic showed positive and significant ($p \leq 0.05$) influence on pastoral household livestock income.

Household size showed positive and marginal significance ($p \leq 10$) influence whereas accessibility showed negative and marginal ($p \leq 10$) influence on pastoral household livestock income. The rest of the variables age of household head, cost of service delivery, and mode of service delivery had positive but insignificant effect on household income, except for satisfaction with available services, which had a negative but insignificant influence on household income. In West Pokot District, the level of education of household head also showed positive and significant ($p \leq 0.05$) influence on pastoral household livestock income. Cost of service delivery showed positive but marginal ($p \leq 10$) influence on pastoral household livestock income. Household size, age of household head, and mode of service delivery had positive but insignificant effect on household income whereas accessibility, availability, and acceptability of services had negative but insignificant influence on household incomes.

The significant variables are described below:

(i) **Education level of household:** In both districts, this factor was significant at 5% level of significance. Education level of the household head influenced the monthly income of a household positively. The result supported the set hypothesis, which was positive. This may have been due to the reason that learnt household heads made more informed decisions in regards to the choice of animal health service deliverers, hence increasing productivity and household income.

Table 25: Factors influencing pastoral household livestock incomes: WLS Regression Coefficients^a for West Pokot District using household income as the regressand and herd size as the weighting variable.

	β	T	Sig.
Household size	.184	1.540	.129
Level of education of household head	.283	2.431**	.018
Age of household head	.167	1.446	.153
Cost of service delivery per month	.210	1.742*	.087
Accessibility to service (Distance to the nearest road/markets)	-.173	-1.428	.158
Availability of extension services	-.055	-.469	.641
Acceptability of service (satisfaction with service)	-.124	-1.072	.288
mode of delivery	.041	.352	.726

a Dependent Variable: Monthly Income level of herder (month)

b Weighted Least Squares Regression - Weighted by Herd size (TLUs)**Significant at 5%;

Significant at 10)%; $R^2=0.246$; $Adj R^2=0.147$; $F=2.492^$

The results were consistent with the findings of Peter, John, Chris and Patti (2006) which showed that the education coefficient was positive, because in their study, they showed that with increase diversification into desirable assets and livelihoods (including education) households can remain active in the pastoral economy. The level of education of a household was assigned a value of 1 if not gone to school, 2 if attended adult classes, 3 if attained primary education, 4 if attained secondary education, and 5 if attained tertiary education.

(ii) **Household size:** Household size was marginally significant in Turkana District (at 10% level) and was not at all significant in West Pokot District. In Turkana District, it had a positive coefficient, indicating that larger households had more income. This suggests that large households had available labor to look after livestock and hence bigger herds, resulting in bigger incomes. In this study, the number of persons comprising a household was converted to adult equivalents (AE) (Rueben and Lary, 1978). An adult equivalent is defined as the proportionate increase in income per adult necessary to maintain a certain level of household living standard given same change in demographic circumstances. For the purpose of this study, an adult equivalent was treated as one adult equivalent whereas for children below eighteen year, one child was treated as being equivalent to half of an adult equivalent. All children below the age of 18 years were calculated as one half of an adult equivalent (Nyariki *et al.*, 2002). The size of a family is assumed to be directly proportional to its demand for food and income to secure other necessities. Larger pastoral families are expected to be secure in terms of labour provision, and therefore can afford to maintain larger herds compared to smaller households (Dahl and Hjort, 1979). However, this is not a linear relationship as noted by the same authors. The authors indicate that depending on the herd size a household has to strike a balance between labour requirements and output. Availability of labour is expected to facilitate migration with livestock, leading to higher productivity and lower poverty. Small households lack the labor to move herds to distance grazing areas. Goats and sheep are also not herded separately and the families do not move their herds outside of a six (6) KM radius of their settlements, hence compromising productivity and household income. This pattern used by small households also contrasts sharply

with that of wealthier and large households, which have sufficient labor to herd goats and sheep separately and to move livestock seasonally (McPeak, 2003). The results of these different grazing patterns are that pastures are unevenly utilized and areas near settlements are over used and degraded leading to low productivity.

Child herding is critical to the pastoral economy since children provide the bulk of the labour force needed for tending the herds. The availability of child labour is crucial, therefore, to the subsistence of pastoral households. It has been argued that the availability of child herding labour influences diversification of pastoral livelihoods since households with a larger family labour would be more willing to devote labour to another income generating activity in addition to pastoralism (Farah, Nyariki, Ngugi and Musimba, 2003).

In Turkana District, household size was marginally significant (at 10% level of significance) whereas the factor was not at all significant in West Pokot District. In Turkana District, higher household sizes translated to more availability of labor available for livestock rearing. This led to higher productivity and hence more income from livestock and livestock products. Due to more diversification of income activities in West Pokot District, high human populations did not translate to high livestock production. Livestock population was relatively lower in West Pokot (average herd size 39.34) District than in Turkana District (90.3). This led to low productivity and hence low incomes from livestock and livestock products.

(iii) **Acceptability of service available:** In Turkana District, the factor was significant at 5 % level, whereas in West Pokot District, it was not at all significant. In

Turkana District, Service available influenced household income positively. For the pastoralists, access to animal healthcare was derived mainly through the purchase of livestock drugs. Thus, the acceptability parameter focused on the consumer preference in relation to the acquisition of livestock drugs. The interpretation of this result is that herders that used the available animal health service (mainly through acquisition of drugs from CAHWs) recorded higher productivity and hence higher incomes. In a study done by Ana Riviere-Cinamond and Michael (2003), it was discovered that community's acceptance of CAHWs led to higher production and income. This finding is in agreement with findings by Van *et al.*, (2004) who reported that acceptability is affected by the attitude of the herders towards the animal health service provider and his evaluation of the cost of intervention.

To determine acceptability of the animal health care intervention, a pair-wise ranking exercise was performed as explained below:

- i. Consumer preferences regarding animal health care: Pair wise ranking exercise were performed which analyzed consumer preferences regarding nearness of provider, advice offered and access to credit.
- ii. How livestock healthcare fits into the overall needs of the community: To evaluate the parameter, ranking exercises were performed among focus groups and individuals to assess the importance of livestock diseases to community well-being. Households were also were also asked to rank the problems they encountered with keeping livestock.

iii. **How** household prioritize expenditures: To derive perceptions regarding livestock healthcare, households were asked to rank major expenditures.

iv. **Perception of quality:** To access the notions of quality regarding animal healthcare, households were asked open-ended questions regarding the differences between human and animal health care delivery, their preferences and perceptions regarding both.

The above scenario may have also been caused by information asymmetry, which often results in adverse selection. Adverse selection occurs when providers of quality animal health care cannot be distinguished from providers of inferior quality or when quality veterinary drugs cannot be distinguished from sub standard or counterfeit drugs. Because of these uncertainties, the livestock owner is unlikely to pay extra for services or goods that are of good quality.

In Turkana District, acceptability of the services available was significant at 5% level of significance whereas in West Pokot, this factor was not at all significant. In Turkana District, CAHWs were more accepted than in West Pokot district, since they were the only services available in the most of the study area. Acceptability of CAHWs in Turkana District led to more utilization of the services and high productivity which impacted positively on household livelihoods. In West Pokot District, herders did not utilize a lot services offered by CAHWs, and most of them could also not afford quality services provided by the private veterinarian and this compromised productivity, leading to low household incomes from livestock and livestock products.

(iv) **Distance to the nearest veterinary clinic:** In Turkana District, distance to the nearest veterinary clinic was significant (at 5% level of significance), whereas in West Pokot District, this factor was not at all significant. The factor influenced household income positively. The interpretation of this result is that the nearer the herder to the veterinary clinic, the higher the income. This is due to the reason that the herder does not spend a lot on transport whenever his animals were sick. The process of animal health care is affected by transaction costs. Transaction costs are the costs (money, time, labour, and money) in the exchange of goods or services that do not benefit either the parties to the transaction (Leonard, 1993). They are associated with making the transaction, both *ex ante* (e.g. seeking out a suitable animal health care provider or traveling in an area to meet the herder) and *ex post* (e.g. monitoring the animal health care provider) and make the demand and supply of animal health care more difficult and less attractive. However, not all transaction costs are linked to the provision of animal health care by the public sector. Many transaction costs are inherent in the service itself. They can be due to the large distance between the animal health care provider and the herder, the often high cost of transport, the difficulty in obtaining quality veterinary drugs, inappropriate use of drugs and the impact of the socio-cultural environment on the decision of the herder.

Moreover, availability of animal health service providers is often affected by the physical distance between him/her and the herder (Woods, 2000). The physical distance is the major factor impeding the delivery of veterinary services by an animal health service provider in rural and pastoral communities.

The above observation was consistent with the findings of Koma (2000) who found that greater distances to health providers noticeably reduced service demand for veterinary services. This in turn affected productivity and household income. Leonard (2004), also reports that the most prominent transaction in animal health service provision particularly in developing countries is distance. It is extremely difficult for a smallholder to transport a large animal to a veterinary clinic, so the veterinarian must travel to the animal. This imposes a double cost on the herder. The herder must pay in time and money to travel to the practitioner to state his/her need for service and then must pay again for the practitioner to travel to the farm. In Uganda, Koma (2000), and Woods (2000) found that greater distance to animal health providers noticeably reduced demand for their services

Distance traveled by a herder and his livestock to the nearest veterinary clinic was measured in Kilometers. Distance was assigned 1 if less than 5 KM, 2 if between 6 and 10 KM, 3 if between 11-15 KM and 4 if greater than 15 KM.

The reason why In Turkana District, distance covered to the nearest veterinary clinics or animal health service deliverer was significant at 5% level of significance, and not at all significant in West Pokot was because in the District, . CAHWs lived in the community and were easily accessible. Their utilization led to high productivity and hence positive impact on livelihoods. In the contrary, in West Pokot District, there was relatively high awareness of quality veterinary services though not affordable. This led to reduced utilization of the services and compromise on productivity and hence low household incomes.

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(v) **Accessibility of animal health care:** as hypothesized, accessibility to animal health care was expected to increase household income through increase in productivity, since sale of milk, hides, meat, skin and live animals was expected to increase (Heffernan, 2001; Dawit, 2003). Accessibility in Turkana District was marginally significant (at 10% level) whereas the factor was not at all significant in West Pokot District. However, in Turkana District, accessibility to animal health care influenced household income negatively. This could be explained by the fact that may be the herders could not differentiate between self treatments and alternative animal health services that they could have opted for, or may be animal health service deliverers are not available in their area. Accessibility to animal health services was examined through focus groups and individual interviews held to transcribe livestock healthcare provider maps. The mapping exercise detailed the availability of government, NGO and private animal health care providers, including CAHWs, and sources of livestock drugs. Individuals were also asked in the semi-structured questionnaires specific information regarding the time required to access the nearest animal health provider, the frequency of use of the nearest animal healthcare services and livestock drug store (Van *et al.*, 2008).

The reason why accessibility (hours taken to nearest animal health) and response time (time taken by animal health service deliverers to respond) were marginally significant (at 10% level of significance) in Turkana District, and were not significant in West Pokot District was because, in Turkana District, contrary to the situation in West Pokot District, CAHWs lived in the community and herders accessed them

easily Utilization of their services increased productivity and hence household incomes

(vi) Response time: In Turkana district, response time was marginally significant (at 5% level of significance). Response time had a positive coefficient indicating that herders were most likely to use animal health services which were offered on time, therefore increasing productivity and income as well. This finding was consistent with the findings of Kathiravan *et al.*, (2009), who reported that the herder whose dependency on livestock for livelihood (as is the case in our study area) is more loses faith in animal health service providers who are not easily available. Increase in response time decreased utilization of the services hence compromising both productivity and income. In this study, the response time was a categorical variable and was assigned a value of 1 if response time takes hours, 2 if it takes days, 3 if it takes a week, and 4 if it takes more than a week for the animal health service deliverer to respond to a herder's call.

6.6 OTHER PARAMETERS TESTED

Other parameters tested included the following:

(i) Cost of service delivery

The cost of delivery was marginally significant in West Pokot District but not at all significant in Turkana District. As hypothesized, cost of animal health service delivery was expected to lower household income through decrease in productivity, since high cost of delivery was expected to reduce demand. In the contrary, cost of service delivery influenced household income positively. This finding is in agreement

with results of a study done by Ahuja *et al.*, (2003), which indicates that price is not an important determinant of the decision to use veterinary services, and those of Heffernan (2001), whose assessment revealed that access to veterinary services rather than affordability is the primary constraint. In Cameroon, there are startlingly high levels of use of more expensive health providers, even among those who cite a concern with price as one of the determinants of their choice, and Haille Mariam (2001) confirms the same in Ethiopia. And this demonstrates that clients are seeking first the quality of care that they feel is dictated by their condition and give only secondary consideration to price.

The reason why cost of delivery was marginally significant in West Pokot District and not in Turkana District was because In West Pokot District, herders are more aware of quality services than in Turkana District. This is attributed to the existence of government veterinarians, who were accessible, besides the existence of a private veterinarian at Kapenguria division (one of the study divisions). Herders spent more to purchase quality drugs and this led to high productivity and hence high household income from livestock and livestock products. Also, part of West Pokot being a high potential area, herders kept improved livestock and this led to improved productivity. On the other hand, in Turkana District, there was no existence of a private veterinarian and the government veterinarians were too far from herders. Herders, therefore, depended on cheaper drugs supplied entirely by CAHWs whose quality could not be verified, hence compromising productivity.

(ii) Affordability of animal healthcare services

The affordability parameter was not tested for significance since it did not vary amongst the interviewees in both districts. This parameter evaluated the minimum necessary level of preventive and curative animal health care in each district. Therefore, the first step was to calculate the 'ideal' treatment cost for a variety of livestock diseases. The 'ideal' treatment regime and costs were obtained from key informants i.e. government and private veterinarians, animal healthcare assistants and CAHWs in each of the districts. Subsequently the actual expenditure on animal healthcare was evaluated. To calculate the total cost of obtaining animal healthcare at the household level, the following general formula was utilized:

Treatment cost = Cost of transport + Cost of drugs + opportunity cost of labour.

To determine cost of transport, in each district, the mean time taken to obtain treatment was evaluated. In cases where public transport was utilized the average cost was determined. Conversely, where informants walked or cycled, the additional time was included in the opportunity cost calculation. Results indicate that access of the pastoralists to animal healthcare was low even in areas with large numbers of community animal health workers.

Most herders, when confronted with issues of affordability always replied to the negative. This is because they think that there is always donor funding tied to the research, and by admitting that they can afford to pay for animal health services, they could be jeopardizing their chances of getting the funding. This could have been the case with West Pokot and Turkana districts. And this could be the reason why cost

was cited as an inhibiting factor to animal health service delivery in 100% of the cases in both districts.

(iii) Access to credit

At the time of the study, none of the interviewees had access to formal financial arrangements, and as a result this parameter was not included in the model for analysis since it was not a variable. This observation is in agreement with observations made by Little *et al.* (2001) who observed that herders rely on a range of different informal finance institutions in support of their business including livestock trading. Herders reported that whenever credit is used in the ASALs commerce, most of it (95%) is obtained informally from kinsmen, friends, and associates.

CHAPTER SEVEN

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

7.1 INTRODUCTION

This chapter presents the conclusions on the aspects of the animal health service delivery systems studied as well as conclusions on the factors influencing pastoral livestock depended household incomes. The chapter provides various policy options necessary for achieving sustainable development and management of the livestock sub-sector in the ASALs. The recommendations thereof presented in the last section of the chapter guide the development of the sub-sector to increase household incomes, assure food security and create employment through improved animal health service delivery systems.

7.2 SUMMARY AND CONCLUSIONS

7.2.1 Status of the various animal health care delivery systems available in selected areas of Turkana and West Pokot Districts.

7.2.1.1 *Quality of animal health services in West Pokot and Turkana districts*

The findings of this study indicate that the delivery of animal health services Turkana and West Pokot Districts of Kenya is under-resourced, often requiring staffing and

transport reinforcement when specific delivery tasks are to be executed. The challenging environment that includes long distances between centres, poor infrastructure, prolonged drought, limited communication, insecurity, high service delivery costs and frequent movement of the community and their livestock is unfavourable for the delivery of conventional veterinary services by either the private or public sector, and thus only serve to aggravate the situation.

The private sector is generally under-developed, and consists principally of retail drugs shops, pharmacies and unlicensed veterinary drug dealers. Besides the Government and the private sector, livestock keepers, sourcing drugs from all manner of sources including inferior and fake drugs from unqualified and unauthorized persons, are also providing curative services mainly for their own animals.

Despite several initiatives by the state to prioritize intensification of land use, upgrading the quality of livestock and providing appropriate support for the livestock sub-sector, it was concluded from this study that these initiative have failed as animal health services in the target districts have not been delivered in an effective and sustainable manner. It was also apparent that the delivery system is not sufficient to improve pastoral incomes and the associated livelihoods.

It can further be concluded that the existing legal and regulatory framework is so unresponsive and weak that it cannot adequately address the current and future challenges in disease and animal health inputs and livestock product quality control. Indeed some of the Acts do not respond to new emerging challenges and are

actually a threat to the acceptance of Kenyan livestock and livestock products in the international markets. Other challenges include low cooperation and maintenance budget, poor information management system and low level of emergency preparedness.

7.2.1.2 *Availability and accessibility of animal health inputs*

In Kenya, enforcement of animal health and products' quality standards has been complicated by conflicting legal mandates, particularly between the Public Health Act (CAP 242) and the Meat Control Act (CAP 356) and the frequent changes in the ministries concerned. In addition institutions responsible for the regulation and control of veterinary drugs and pesticides have been, until recently, placed in the ministries of health and agriculture (CAP 244- Pharmacy and Poisons Act and CAP 346, Pest Control Products Act). As a result, the department of veterinary services has minimal control over these conflicting statutes on drugs or pesticides. To try and redress the situation an inspectorate section was created under the Director of Veterinary Services in 2007, but this still is yet to be provided for in any of the statutes to make it legally effective. There is, therefore, need for reviewing, rationalizing and harmonizing these conflicting mandates in order to adequately address animal health and product availability, quality and marketing.

7.2.1.3 *Inadequate funding to the Veterinary Department*

According to the provisions of the Animal Health Disease Act, CAP 364, the government, is expected to play a major role in disease control and surveillance. The

present study, however, observed that that the Department of Veterinary Services does not have the financial, human or physical capacity to meet its statutory obligations. This essentially means that the department is unable to protect herds and flocks in the region which partly accounts for the spread of PPR from Southern Sudan to the whole of Kenya between 2005 and 2009.

7.2.1.4 *Inefficiencies in Livestock Movement Control*

Livestock movement is a critical area that requires a lot of inputs to regulate and control as lack of organized disease control programs in neighbouring countries pose a constant threat of disease introduction to Kenya. From the results of this study, it is concluded that poor disease control was a bigger problem than delivery of curative services in the target districts and other ASALs. The situation is compounded by the fact that the arid and semi arid areas are all along Kenya's international boundaries and that Kenya's relative prosperity in the greater horn of Africa makes it the major market for livestock from the region, albeit the fact that most animals are moved and traded informally. The fact that pastoralists in West Pokot and Turkana districts migrate long distances in search of pasture only serves to further complicate the control of major epizootics.

7.2.1.5 *Challenges to privatization of animal health service delivery in the ASALs*

Both public and private animal health service deliverers said that they lacked capacity to respond to diseases. Reasons given for the scenario included; lack of

transport and poor road infrastructure; strained budgets; poor communication with farmers; understaffing of the veterinary department; insecurity; Poverty on the side of the farmer and hence the inability to pay for services; inadequate policies; poor livestock markets; and migration by the community and hence the inability to keep track of them.

Privatization has been promoted all over the world to improve efficiency and effectiveness of services, on the assumption that private sector organizations are more flexible, and that competition between providers will drive prices down. Early experiences indicate that in remote areas, where many poor livestock keepers live, are often disadvantaged as neither public nor private veterinarians are willing to provide regular quality services. Given that the CAHWs based animal health service delivery system is not sustainable it is imperative that alternative approach such as farmer field schools is tested and adjusted to function in the ASALs in the interim.

7.2.1.6 *Challenges to delivery of veterinary services by CAHWs*

Many CAHWs programs were neither sustainable nor tenable as they heavily depended on facilitating agents; they lacked or had weak supportive drug supply system; there were no clear exit plans by the facilitating agents; and there was limited knowledge on drugs and drugs administration, and in sampling especially in collection of blood samples. There was inadequate harmonization or or systematic approach to refresher courses; limited or lack of opportunities for sharig information and experiences; poor supervision and monitoring; weak linkages with district veterinary offices; competition from livestock owners who keep their own drugs or use

traditional medicine; competition from peddlers who supplied cheaper but low quality drugs; poor motivation or obligation to report diseases; low volumes of operating inputs/drugs; and droughts leading to free drugs intervention by various organizations.

7.2.1.7 *Problems associated with livestock marketing*

The challenge to accessing the export market is enormous and revolves around international concerns for food safety, quality assurance and origin of animals, and certification of animal health quality, which in professional terms are referred to as sanitary requirements. In the study, problems associated with livestock marketing reported included ignorance, poor legislation, poor infrastructure (market outlets, poor roads, lack of telephones, lack of market information), high poverty levels, lack of basic education of farmers, consumer eating habits (consumers refusing to eat frozen meat), food safety requirements, conflicts and insecurity.

i) Ignorance

Focus group discussions revealed that pastoralists in the two districts depended entirely on middle men for the sale of their animals. They did not have access to market information and may not even know the current prices for livestock. Being the primary producer, middle men bought livestock from them at very low prices and sold the same to the local markets or sales yards. The next level of middlemen bought livestock from the yards and sold them to the slaughter houses. The only area we did not have middlemen is from the butchers to the consumers.

dispose off their animals at cheap prices in order to buy other foodstuffs such as maize that they do not grow.

iv) Livestock diseases

Livestock diseases affect both the local and external markets. Whenever there is an outbreak of a zoonotic disease in the country, quarantine is imposed and all livestock markets are closed down. This closure of livestock markets was reported to impact negatively on pastoralists, whose main livelihood, as shown in the results of this study, is livestock.

v) Food safety requirements

Zoonotic diseases, drug residues in meat and milk, contaminants, toxins, and additives affect food safety and hence markets. Although no surveys were done to determine drug residue levels in these two districts, zoonotic diseases, drug residues in meat and milk, contaminants, toxins and additives are common problems where we do not have efficient animal health service delivery as is the case in the districts under study.

It can be concluded from this study that Kenya lacks sound policies on physical and social infrastructure, and in cases where policies have been put in place, there is lack of implementation framework, enforcement and compliance.

7.2.1.8 Pastoral Field Schools

Pastoral field schools have achieved a lot in the ASALs especially in areas of crop and livestock. Pastoralists have been trained to participate in disease search, trade

and emergency preparedness, and since the veterinary surgeons act does not prohibit the farmer from treating his/her own livestock, farmer training would be a way forward towards animal health service delivery in ASALs but farmers' roles should be limited to disease search and reporting.

7.2.2 Importance of empowerment of veterinary personnel

In this study, quality veterinary services in Turkana and West Pokot Districts were found to be practically inaccessible, and this situation is reflective of the situation in other ASAL areas in Kenya. Besides, CAHWs, the majority of the animal health service deliverers in these areas did not address the new sanitary demands, and in any case contributed to the problems of drug residues. As a result, the pastoral activity of these populations is thus in danger of being more and more marginalized. The future of these populations could be reduced to self-consumption of their ruined pastoral production, depending more on humanitarian aid.

7.2.3 Alternative livelihoods in the ASALs

As is indicated by the results of this study, other than livestock keeping, the pastoralists in West Pokot and Turkana Districts engaged in other livelihood activities such as petty businesses, mining, crop farming and charcoal selling. However, non of these livelihoods was found to be secure besides being unsustainable.

Most pastoralists engaged in petty business because of lack of capital to set up reasonable businesses. Entrepreneurship would be a means of inclusion into labour

market, an escape from poverty. Results also indicated that most people lacked both physical and human assets. Ensuring peoples' access to physical and human assets could be a good entry point for policy provision. Microfinance seems to be promising in terms of improving consumption; encouraging participation of households in non-farm employment and use of purchased inputs, even though there is inadequate evidence about its role in asset building.

7.2.4 Land use information

All pastoralists interviewed reported that at one time or the other of their lives, they had suffered land shortage. Kenya lacks a sound land policy, despite the UNDP policy on disaster management and preparedness for the year 2002 (to reduce exposure to risk and vulnerability through a coherent and comprehensive policy on disaster management). Up to date, (regardless), pastoralists, the largest land users in ASALs, are still being forced, during droughts, to migrate with their livestock to traditional grazing areas in other districts or neighbouring countries. This leads to acute shortage of traditional food for family members.

Given this current land situation in Kenya, it is imperative that the ongoing formulation process of National land policy be all-inclusive if it will urgently formulate a sound land policy framework to guide the utilization, management and governance as well as conservation of resources.

7.2.5

Factors influencing pastoral household livestock- dependent incomes

After weighing, amongst other factors affecting household income in Turkana district, it was concluded that the level of education of household size, accessibility to and acceptability of animal health services, distance to veterinary clinics, time taken by the animal health service deliverer to respond to a herder's call and household size significantly influenced household income. The effects of cost of animal service delivery, satisfaction with the animal health services offered and the mode of animal health service delivery (Community Animal Health Workers) were so weak as to lack significance in the sample chosen.

In as far as cost of animal health service delivery was concerned, clients were observed to seek for quality of care that they felt was dictated by their particular condition and gave only secondary consideration to the price.

7.2.6 Status of the local capacities for peace

Results of the study indicate that peace initiatives in the two districts are mainly by NGOs, government, and traditional mechanisms. However, results indicate that peace interventions were not effective. Both NGOs and government policies in peace initiatives were found to be inadequate. However, the traditional peacemechanisms were found to be achieving to some extend.

Violent conflicts and raiding hinder the delivery of vital services such as education and human and animal health care in the two districts. Conflicts have particularly significant impact on animal health because raiding increases transboundary

epizootic diseases transmission and impedes the improvement of veterinary surveillance and livelihoods dependent on livestock keeping.

Whereas formal peace mitigation structures on the ground were not achieving, it was reported that traditional peace structures were achieving to some extent. It is also clear from results of this study that women play very important roles, both positive and negative, with regard to raiding and other forms of conflict. The informal power held by women within the household is a crucial aspect for peace building organizations to build on. Through the same power, women are able to make a significant impact, both positive and negative on the behaviour of husbands and sons. Organizations should encourage those positive impacts that women are able to make in relation to peace mitigation.

It can be concluded from the results of this study that pastoralists are marginalized and are particularly vulnerable when droughts or other developments limit their already restricted access to water and pasture. It is also clear that existing policies and measures relating to pastoralists in West Pokot and Turkana districts, as well as other similar districts in Kenya are inadequate. Efforts to prevent and reduce conflicts need to be fully integrated into government and development programmes.

7.3 RECOMMENDATIONS

7.3.1 An overview

This study has established that there is real need to strengthen the existing capacity in animal health service delivery in the ASALs. In order to face, and deal with the new demands in animal health care and meet regional and international market demands, Kenya must develop a veterinary system that is effective and credible. Such a service should be convincing, evolving and likely to gain more and more control over epizootic diseases and zoonosis and develop and implement a credible live animal and meat inspection and certification system including traceability. It would also be prudent for the government to shift emphasis from producing raw livestock products to value added products while strengthening public-private partnerships.

The study has also established that a multifaceted approach towards alleviation of poverty in the ASALs is needed and if we are going to have improved livestock, then there is a whole range of services that are needed to enhance the capacity of poor households to exploit the full potential of livestock production. These include livestock research and extension, other market services such as credit, livestock insurance, delivery of market information and output marketing. Other interventions will include making water available, infrastructure, markets, grass seeding, introducing irrigation and possible agrulture, preventing further soil erosion and improving the fertility of the soil, improving human health through providing health care facilities, schools and other social infrastructures.

The findings of the present study have led to the following recommendations:-

7.3.2

Review of relevant policies and legal frameworks

7.3.2.1

Policy, legal and institutional frameworks of the livestock sector

To address the identified challenges, it is imperative that a thorough review of supporting policy, legal and institutional frameworks of the livestock sector is undertaken to allow for the development of a competitive livestock industry. It is recommended that subsequently the government enforces the prevailing policies and legal frameworks to maximize livestock production and productivity and marketing.

The Pharmacy and Poisons Act Cap 244 should be amended in order to allow veterinarians to trade in veterinary drugs and incorporate veterinarians in drugs inspectorate services. In the meantime a Veterinary Medicine Act should be enacted, and the veterinary drug inspectorate empowered to prosecute.

The government also needs to facilitate a forum to review the implementation of privatization policies and their impact on animal health service delivery in the arid areas where the operating environment is not conducive for profitable private veterinary services. Other policies to be considered include: animal health; meat inspection; diagnostic services, research and development, livestock production and marketing, livestock industries, livestock extension, education and training.

7.3.2.2

Policy and legislative frameworks on land

It is recommended in this report that Kenya should come up with sound policy and legislative frameworks on land. There is an urgent need for the state to engage with the issue of land rights and how far back these should go. Land ownership will

prevent displacement of the pastoralists since owners will be able to develop what they can call their.

7.3.3 Promotion of public/private sector partnership

(i) Promotion of private public sector partnerships

A stronger public/ private partnership is recommended, as it is necessary to facilitate greater participation by other stakeholders in disease and pests control, in the establishment and strengthening of communication centers/structures and information sharing forums that permit public-private sector linkages and collaboration and community participation.

Policy makers should make efforts to bridge the transition from full state provision of Animal Health Services (AHS) to the formation of a partnership with the private sector. The government, with or without the support of development partners, needs to take active steps to facilitate the process of privatization of AHS especially those targeting the poorer rural subsistence and pastoralists farming systems. This would entail an initial investment in developing the necessary management skills in the delivery systems while bringing on board the animal health technicians.

The state should also issue sanitary mandate to private veterinarians on regional basis, in order to have private veterinarians implementing the missions from state contracts (vaccinations, blood samples, epidemio-surveillance, and drug supply). It should further facilitate access to equipment loans for veterinarians. This will satisfy the farmer for he will be taken care of, the government will also get disease reports and it will work as an incentive to the private veterinarian.

(ii) Out sourcing private sector to meet sanitary mandate and provision of inputs

The Governments should seek to develop appropriate development strategies while introducing concepts of a market oriented approach towards agriculture and livestock production in particular, the role of government in future being to provide a reduced range of essential 'public good' services and to create a favorable environment in which the private sector could become established as a provider of 'private good' services and at the same time act as a partner in carrying out certain public functions under contract or 'sanitary mandate' . For example under these arrangements the private practitioners will be empowered to vaccinate livestock against the major epizootic before the pastoralists migrate and when they come back from dry season grazing areas.

7.3.4 Continuing veterinary education and communication

The Government should facilitate the development and implementation of training courses, targeting mainly the veterinarians, animal health, animal production, water and range technicians and animal scientists. Such training should cover specific areas that the department of veterinary services may identify including the epidemiology and control of economically important diseases, data management and analysis, participatory disease search, communication skills, livestock production, breeding, nutrition, water management, pest control and animal health economics, ethics in animal health service delivery and cold chain management among others.

In collaboration with other stakeholders, the government should promote and support the establishment and strengthening of communication centers, information sharing forums, and coordination of players and stakeholders, especially at the district level.

7.3.5 Capacity building through increased allocation of adequate funds and provision of adequate tool and equipment to the Department of Veterinary Services

The government should take necessary steps to allocate adequate funds to the relevant departments for the control of notifiable diseases and for compensation of farmers where stamping out programmes are done. The Animal Disease Act (Cap 364) should be reviewed to accommodate same financial allocation for compensation, and rapid emergency response capability.

Currently, there is inadequate capacity to handle cases of emerging and other animal diseases that may occur. In order to contain cases of diseases that may result from emerging diseases, it is recommended that the government establishes an emergency disease fund.

7.3.6 Seeking alternative service provision system other than CAHWs

As shown by the participatory study and questionnaire results of this study, herders perception on pastoral field schools, personal observations, and evidence that CAHWs are not sustainable besides being unsupported by the existing legal and policy framework, this report recommends greater integration of the private sector

and beneficiary communities in various aspects of animal health service and input provision including outsourcing of the private practitioners and pastoral field schools to provide public good services. Such integration, however, requires the State to develop supportive policy and legal frameworks and to provide adequate physical, financial and human resources.

7.3.7 Expanding of the national extension programs to pastoral areas

In recognition of the increasing role of other stakeholders in extension service provision, it is recommended that the government promotes pluralism in extension service delivery and institute mechanisms to coordinate extension services to ensure delivery of quality extension service in ASALs. The government should establish a harmonized institutional framework for coordination of all extension projects/programs within the livestock sub-sector in line with the aspirations of the National Agricultural Sector Extension Policy (NASEP). National Extension Programs (NEPS) should be revived and those already existing such as NALEP be strengthened. Farmer field schools should be used to increase awareness of both the farmer and the consumer. Farmers need to be educated on drug quality, administrations, and withholding periods where it concerns livestock. Education and extension will also raise awareness of the pastoralists hence lowering some finance draining cultural practices such as cattle raiding, circumcision and dowry. Education will also make pastoralists more accommodative and hence reduce conflicts.

7.3.8 **Alternative livelihoods**

7.3.8.1 *Entrepreneurship and microfinance provision*

The objectives of preserving the environment, generating incomes and employment, and alleviating poverty can be achieved through promotion of small scale enterprises. This is to put emphasis on development of alternative and supplementary livelihood systems to reduce pressure on land-based resources.

Large and micro-financial institutions offer crucial services to the rural areas by providing banking services, insurance, credit and financial advice. In order to exploit this potential, it is recommended that the government establishes the necessary mechanisms to encourage institutionalized banking in the rural areas in form of micro-financial institutions.

7.3.9 **Disease surveillance and response to emerging and re-emerging diseases**

7.3.9.1 *Need for integration between the public health and livestock sectors*

In relation to response to emerging and re-emerging diseases, the public health, livestock and communication sectors were found not to integrate and usually went divergent ways in cases of disease outbreaks. This study recommends formation of collaborative structures awaiting emergencies. There is also need to have shared resources in terms of process and mechanisms to make them complementary, using zoonotic diseases as a baseline/entry point, e.g. shared diagnosis, and surveillance and campaign teams should pave way to the concept of one health.

It is further recommended that the government upgrades the infrastructure of the existing laboratories and enhance their capacity building to internationally required standards. The necessary instruments should also be established to enhance closer liaison between public and private laboratories in order to boost the overall national capacity for diagnostic and quality assurance.

7.3.9.2 *Ownership of disease control programs by National Programs in terms of design and costs*

For the continuity and sustainability of diseases surveillance, the Department of Veterinary Services should sensitize policy makers to increase budget allocations to the Ministry of livestock development so that in case of a break or stop to donor funding, activities related to disease surveillance do not get interrupted or compromised.

It is also recommended that Kenya develops contingency plans for all Trans-border diseases. The plans should be desk simulated to ensure that they work. Integrated National Action Plans (INAPS) for other diseases such as RVF and PPR should also be developed and desk simulated.

7.3.9.3 *Regional approach to disease control and prevention*

Due to the porous nature of borders between neighbouring countries, this study recommends that Kenya seeks collaboration with neighbouring states to strengthen both national and regional animal movement and disease surveillance, monitoring

and control, as well as providing rapid response to check the effects of disease outbreaks. The government should, therefore, spearhead formation of a regional epidemio-surveillance network for TBDs and other priority trade sensitive diseases in the region. Regional approach to disease control and prevention will include: harmonization of the legislative framework for pastoralism, governments' support to trade and pastoral livelihoods in the region; regional harmonization of legislative framework governing surveillance, policies and regulations that will eventually guide privatization of veterinary services including a harmonized privatization plan for the region, harmonization of peace building interventions, and formation of communication networks.

7.3.9.4 *Drought and disease early warning systems*

It is recommended that early warning system for diseases to be included in the veterinary curriculum and that veterinarians be trained on the same in order to be able to predict diseases. It is further recommended that the government sets up measures to institutionalize drought early warning systems in the country that will be strengthened through adoption of the necessary mitigation interventions. Further, the government should also establish and institutionalize mechanisms for emergency livestock-take off.

7.4.0 **Improvement of livestock marketing**

In order to adequately address the infrastructural challenges facing the livestock industry, it is recommended that the government, in collaboration with other

stakeholders, explores ways and means of ensuring adequate investment in livestock infrastructure to enhance livestock production and marketing. It is recommended that the government, in collaboration with the relevant stakeholders, rehabilitates livestock marketing infrastructure and supports the establishment of efficient market information, which is an essential element for enhancing market competitiveness.

Insecurity and threat of livestock rustling restricts livestock movement and adversely affects trade. It is recommended that the government improves security while reintroducing compulsory modern livestock identification system to discourage cattle rustling and general insecurity. It is further recommended that the government in collaboration with the affected communities strengthens the existing conflict prevention and resolution mechanisms, promote peace building initiatives and strengthen existing conflict resolution structures.

It was observed that some key socio-economic factors, which also influence livestock production, have not been given sufficient attention in the past. Instead, most research has concentrated in addressing itself to technical production problems (breeding, feeding, health, and husbandry), at the cost of such key socio-economic parameters that equally affect livestock producers. In this regard, in addition to addressing various technical problems facing livestock producers, processors and marketers, it is thus recommended that the government, in collaboration with stakeholders in the livestock sub-sector, also takes measures to streamline research and extension on socio-economic factors that affect livestock production and marketing.

Privately owned abattoirs should be established. These should be equipped with laboratories, where samples from both the abattoir and the field can be analyzed, and thus animal diseases can be identified and dealt with without delay, thus allowing locals to monitor recurring diseases.

Moreover, with good disease control measures put in place, the abattoir will also serve pastoral communities of neighbouring countries of Uganda, Southern Sudan, and Ethiopia. This will eventually promote peace among the pastoralists cluster when the pastoralists are peacefully trading with each other, instead of the frequent raiding that currently characterizes the communities.

7.4.1 Development of National policies that enhance the economic viability of pastoralism

The Government should develop National development policies that enhance the economic viability of pastoralism in semi-arid areas and reduce the vulnerability of pastoralists to droughts, price fluctuations and other external factors. This will be achieved through the following:

- Reviewing the impacts of current development policies and of laws and regulations relating to land tenure and access to water
- Mainstreaming conflict prevention measures involving pastoralists
- Performing regulations relating to access to pasture land and water for pastoralists
- Ensuring emergency access to adequate water and pasture during drought
- Reducing economic vulnerability during crises such as droughts. This will involve measures being put in place such as programs to assist pastoralists to

sell their herds during droughts and to restock their herds after the drought has passed.

- Support efforts to strengthen participation in political institutions and decision making processes
- Support education programmes for pastoralist communities
- Assist in controlling and reducing small arms
- Combat cattle rustling.

7.4.2 Empowering capacities for peace.

It is recommended that the traditional peace mechanisms already on the ground be strengthened and facilitated to work on their own towards peace initiatives. The government should ensure broad all encompassing security to include physical, property, social and economic security.

Peace programs should use local structures, with the venues for peace talks being as natural as possible. Peace initiators should also target the right people, people who are actually involved in cattle raids and related conflicts, either actively (morans) or morally (women and foreseers), with the agents of peace working towards promoting connectors and reducing dividers. A forum that brings together all agents involved in peace and conflicts initiatives is mandatory. The agents will be able to share activities, develop common strategies and avoid duplication.

REFERENCES

- Abdillai, A.B., Getachew, G., Solomon, D., Lyne, D.C (2003):** Pastoralism in Kenya and the policy environment: Linking research, development actors, and decision makers. In: summary of proceedings of a meeting held at the Kenya Agricultural Research Institute (KARI) headquarters, Nairobi, Kenya, on 14th August.
- Agency for technical cooperation and development (ACTED) (2009):** The issue of drought in the horn of Africa: community members provide a vital trade link for agro-pastoralist populations in Uganda.
- Ahuja, V. Redmond, E (2004):** Economic and policy issues in livestock service delivery to the poor". *Tropical Animal Health and Production*, **36** (3): 247-268.
- Ahuja, V., Jan, M., Arindans, S (2003):** Veterinary services delivery and the poor: Case of rural Orissa, India. *Rev. Sci.tech.off.int.Epiz*, **22** (3): 931-948.
- Ajele, C (2005):** Status of livestock marketing in Turkana District. Proceedings of a workshop held in Turkana District, Department of Livestock, Turkana, Kenya, 20th April 2006.
- Alejandro, N.P., Ehui, S., Samuel, E.B (2007):** Livestock productivity in developing countries: An assessment. *Handbook of agricultural economics*, **3**, pages 2461-2532 Elsevier.
- Alila, O.P., Atieno, R (2006):** Agricultural policy in Kenya: Issues and processes. A presentation during future agriculture's consortium workshop held at the Institute of development studies, Nairobi, Kenya, 20-23 march.
- Aklilu, Y (2002):** An audit of the livestock marketing status in Kenya, Ethiopia and Sudan, Issues in the marketing of livestock in Kenya, Sudan, and Ethiopia. **1**: 2-84.
- Aklilu, Y (2002):** An audit of the livestock marketing status in Kenya, Ethiopia and Sudan, Issues and proposed measures. **2**: 2-32.
http://www.eldis.org/full text/cape_new/AKLILU marketing vol 2.pdf.
Search done on 20th August 2004.

Ana Riviere-Cinnamond., Michael, E (2003): Community based animal health workers (CAHWs) in pastoral areas of Kenya: A study on selection processes, impact and sustainability in west Pokot, Marsabit and Turkana districts. A study done for FAO, CAPE and CLIP, pages 7-63.

Ashley, S (2004): Pro-poor livestock development.
<http://www.livelihoods.org/info/docs/livesh1doc>.
Date of search 11th August 2006

Ashley, S., and Nanyeenya, W. (2002): More than income: Pro-poor livestock development policy in Uganda, the IDL group, Crewkerne.
http://www.igad-lpi.org/publications/docs/IGADLPI_wp10_082.pdf
Search done on 15th April 2004.

Barnard, B.J.H., Van Derlugt, J.J., Mush, E.Z (1994): Malignant catarrhal fever, in infectious diseases of livestock, Coetzer, J.A.W Thomson, G.R and Tustin, R.C., ed., Oxford University Press, New York.

Barret, C.B., Luseno, W.K (2004): Decomposing producer price risk : A policy analysis tool with an application to northern Kenya livestock markets. Food policy, 29:393-405.

Belachew, H.D., and Hargraeves, S.K (2003): Consultancy report on livestock export zones. FAO Project GCP/RAF/365/EC.

Bellon, M. R., and Taylor, J.E (1993): Farmer soil taxonomy and technology adoption. Economic development and cultural change: 41: 764-786

Blair, T (2005): Commission for Africa's report, pages 16-464.
<http://www.commissionforafrica.org>
Search done on 30th June 2007.

Blench, R., Chapman, R., and Slay-Maker, T (2003): Pro-poor livestock policy initiative: A study of the role of livestock in poverty reduction strategy papers. PPLPI Working paper No.1
<http://www.fao.org/ag/aqainfo/projects/en/pplpi/home.html>
Search done on 15th June 2004

Brian, P., Alejandro, N, P., Keith, S., and Christopher, S. (2005). Pro-poor Livestock policy initiative: An appropriate level of Risk: Balancing the need for safe livestock products with fair market access for the poor. PPLPI working paper No. 23.

Bruce, M (2004): FAO corporate document repository: Regulatory issues in Africa's regulatory framework. Paper presented during the joint FAO/WHO technical workshop on residues of veterinary drugs without ADI/MRI, 24-26 August, Bangkok, Thailand.

Brückner, G.K (2004): Relations between official and private veterinary services in epidemiology and the control of contagious diseases. *Rev.Sci.tech.Off. Int. Epiz*, **23** (1), 95-107.

Bryant, K.W., Bawden, D.L., Saupe, W.E (1981): The economics of rural poverty-a review of the post-world war II United States and Canadian literature. In: Martin, L.R. (ed), *A survey of agricultural economics literature: Economics of welfare, rural development, and natural resources in agriculture, 1940s to 970s.* University of Minnesota Press, Minneapolis, pages 3-75.

Cater, M.R., Little, P.D., Mogues, T., and Negatu, W (2006): Shocks sensitivity and resilience: Tracking the economic impacts of environmental disaster on assets in Ethiopia and Honduras. DSGD discussion papers 32, International and Policy Research Institute (IFPRI).

Catley, A., Leyland, T., and Kaberia, B (2002): Taking a long- term perspective: Sustainability issues, "in Catley, A., Blakeway, S., and Leyland, T., eds., *Community –based animal healthcare. A practical guide to improving veterinary services.* London:ITDG publishing, pages 1-368

Catley, A., Leyland, T., Mariner, J.C., Akabwai, D.M.O., Admassu, B., Asfaw, W., Bekele, G., and Hassan, A (2004): Para-veterinary professionals and the development of quality. Self-sustaining community-based services; Office International des Epizootics *Revue Scientifique Technique*, **23** (1)225-52

Campell, D.J (1999): Response to drought among farmers and herders in Southern Kajiado district, Kenya: A comparison of the 1972-1976 and 1994-1995. *Journal of human ecology*, **27** (3):377-416

Catley, A (2005): Participatory epidemiology; A guide for trainers, African Union /Inter African bureau for animal resources, Nairobi, Kenya, pages 1-116

Carlos, S. (2007): Livestock, livelihoods and local markets. A paper presented during an ILRI workshop held in Stockholm on 26th September.

Coleman, P.G (2002): WHO/DFID-AHP meeting on the control of zoonotic diseases: A route to poverty alleviation among livestock-keeping communities, held in WHO headquarters, Geneva (Salle D), 20th and 21st September.
http://www.who.int/zoonoses/diseases/september_2005background.pdf
Search done on 12th July 2006.

Dasgupta, P (2003): Economic development; environmental degradation, and the persistence of deprivation in poor countries.
http://www.cimmyt.org/research/economics/map/research_results/distinguished/economist/lecture_dasgupta.htm
Search done on 12th April 2004

Dahl, CG., and Hjort, A (1979): Pastoral change and the role of drought. SAREC report 2 Swedish Agency for Research Cooperation with Developing countries. Pages 1-50. Stockholm

Dagi, K (2008): All Africa. Com: Kenya: Livestock disease alarm, 12th October.
<http://allafrica.com/stories/200810/30154.htm>.
Search done on 12th March 2007

Dasgupta, P (2003): Economic development, environmental degradation, and the persistence of deprivation in poor countries.
http://www.cimmyt.org/research/economics/map/research_results/distinguished/economists/lecture_dasgupta.htm.
Search done on 12th March 2007

David, C.H., Simeon, E., and Christopher, D (2005): The livestock revolution, food safety, and small scale farmers: why they matter to us all. Journal of agricultural and environmental ethics. Spring Netherlands, 17, Nos 4-5, pages 425-444

Dawit, A (2005). "Contribution of livestock development to poverty reduction among pastoral communities of the horn of Africa." Paper presented at the international symposium: The role of livestock in poverty reduction, Brussels, TROPICULTURA, special edition, ISSN-0771-3312, pages 5-10.

Delgado, C., Rosegrant, M., Steinfeld, S., Ehui., and Courbois, C (1999): Livestock to 2020. The next food revolution. Food, Agriculture and the environment discussion paper 28, Washington DC: International Food Policy Research Institute. (IFPRI)/FAO/ILRI.

De Haan, C., Bekure, S (1991): Animal health services in sub-Saharan Africa: initial experiences with alternative approaches. World Bank Technical Paper number 134. Washington DC, World Bank

Director of veterinary services Kenya (2009): Meat production annual report for 2007 and 2008.

Economic Commission for Africa (ECA) (1998): Roles of the United Nations Economic commission for Africa (ECA) in the implementation of the convention to combat desertification. Paper presented by ECA representative at the workshop on ' A network for the promotion of rational use of rangelands and the development of fpdder crops in the context of the regional action programme to combat desertification in Africa. ILRI, Addis Ababa, Ethiopia, 4-7th August.

Emana B., Gemtesa, K., Tiki, W., Rebu, W., Asfaw, L (2005): The role of indigenous institutions in pastoral livelihood strategies in Ethiopia. <http://www.eeacon.org/bezabih/Emana/>. Search done on 2nd March 2007

Export processing Zone (EPZ) (2005): Meat production in Kenya. <http://www.epzakenya.com/UserFiles/File/meatindustry.pdf> Search done on 2nd March 2007

Food and Agriculture Organization (2007): FAO animal production and health proceedings: CBPP control: Antibiotics to the rescue: FAO-OIE-AU/IBAR-IAEA consultative group meeting on CBPP in Africa, held in Rome, 6th -8th November 2006.

FAO (2003): Agricultural extension, rural development and the food security. Food and Agriculture Organization of the United Nations, Rome. www.fao.org/sd.erp/toolkit/ERptkPrintSingletem_es.asp? Search done on 11th July 2006.

FAO (2002): Improved animal health for poverty reduction and sustainable Livelihoods. Animal production and health division, FAO animal production and health paper number 153 page 52.
<http://www.fao.org/docrep/005/y3542e/y3542e05>.
Search done on 11th July 2006

Food and Agriculture Organization (FAO) (1999): Developing National emergency prevention systems for transboundary animal diseases. FAO animal production and health paper 137. FAO, Rome

FAO (1999): Effects of structural adjustment programmes on the delivery of veterinary services in Africa. Report done for the Animal production and health division, FAO, Rome, Italy.

Farah, K.O., Nyariki, D.M., Noor, A.A., Ngugi, R.K., and Musimba, N.K (2003): The socio-economic and Ecological Impacts of Small- scale Irrigation Schemes on pastoralists and Dry lands in Northern Kenya. Journal of Social Sciences, 7 (4): 267-274

Field, C.R (2005): Where there is no development agency: A manual for pastoralists and their promoters. NRI (Natural Resources International), Ayles Ford, Kent, UK, page 260.

Francis, M., Pauline, I., Frank, M (2009): Environmental and social impact assessment (ESIA) for lake Turkana wind power project-Kenya, page 10.

Freund, J.E., Benjamin, M.P (2006): Modern elementary statistics (12th edition), Prentice Hall, pages 1-561.

Fra, Z (1992): Pastoraists and agropastoralists loosing ground: a horn of Africa perspective. Paper presented to the workshop on security in African drylands. Scandinavian institute of African studies (SIAS), UPP Sala, Swedden. November 5-7

Gakure, J., Mbogo, D., Ochieng, T (2006) : Turkana District short rains assessment. Government printers, Nairobi.

Gatarwa, K (2006): Livestock information network and knowledge systems (LINKS) global livestock crsp extending the technical and human capacity to meet information needs and decision support for livestock producers, traders, and policy makers. Paper presented during a seminar held on 23rd in October at the Safari park hotel, Nairobi.

Getachew, G., Solomon, D., Seyoum, T., and Layne, D.C (2005): Institutional innovation for improving pastoral access to emerging export markets for small ruminants: A case from the East African Rangelands. Conference on International Agricultural Research for Development. Paper presented at the Deutscher Tropentag, October 11th -13th, Hohenheim. "The global food and product chain-dynamics, innovation, conflicts, strategies".

Gichaga, J.F (1999): Opening speech. In: Proceedings of a national workshop, 'sustainable pastoral production systems and environmental securities in the drylands of North-Eastern Kenya, 14th-15th October; Machakos, Kenya; D.M. Nyariki and K.O. Farah (editors); @ Redpa-Pinep, department of range management, University of Nairobi. ISSN 1021-8688.

Griffith, A (2005): Value chains, linkages and service markets: Understanding the situation . Market mapping in the herbal products sector, Kenya. A practical action case study, Nairobi, Kenya. Pages 1-6.

Gritli, R (1997): Literature review on nomadic women and the use of rangelands. FAO, Rome, Italy.
<http://www.fao.org/ag/AGP/agpc/doc/pasture.spectopics/rangelands.htm>
Search done on 11th August 2005

Government of Kenya (GOK) (2004): State of environment report, pages 195-200.

GOK, Sessional paper No 1 (1965): 'African Socialism'. Government printer, Nairobi.

GOK, Sessional paper No 1 (1986): 'Economic management for renewed growth'. Government printer, Nairobi.

GOK, Sessional paper No. 2 (2008): 'National food Policy', Government printer, Nairobi.

- GOK (2000):** The 1999 population and housing census. 'Counting our people for development.' Central Bureau of statistics, Ministry of finance and planning, Volume I and II, Nairobi.
- GOK (2002a):** Turkans district development plan for the period 2002-2008. Government printer, Nairobi
- GOK (2003):** Fiscal year budget 2002/2003. Government printer, Nairobi
- GOK (2004):** State of environment report, Kenya. Pages 195-200. Government printer, Nairobi
- GOK (2004):** Fiscal year budget 2003/2004. Government printer , Nairobi
- GOK (2005):** Fiscal year budget 2004/2005. Government printer, Nairobi
- GOK (2006):** Fiscal year budget 2005/2006. Government printer, Nairobi.
- GOK (2007):** Fiscal year budget 2006/2007. Government printer, Nairobi
- GOK (2008):** Fiscal year budget 2007/2008. Government printer, Nairobi
- GOK (2007):** Office of the president. Special programme; National policy for the sustainable development of Arid and Semi-arid lands of Kenya.
- GOK (2008):** West Pokot District vision and strategy. PricewaterhouseCoopers.
- GOK (2009):** Fiscal year budget 2008/2009. Government printer, Nairobi
- Hall, D.C., Ehui, S., and Delgado, C (2004):** The livestock revolution, food safety, and small –scale farmers: Why they matter to us all, Journal of agricultural and environmental ethics, **17**:425-444.
- Hassan, N.H (1997):** Violence in Rift valley province.
http://www.marsgroupkenya.org/Reports/Government/2008/10/waki_chapters/Chapter_3_violence_in_rift_valley.pdf
Document searched on 20th July 2007

- Heffernan, C (2001):** Consumer preferences and the uptake of animal healthcare by the poor : a case study from Kenya. *Journal of international development. J. Int. Dev.* **13**, issue 7, pages 847-861.
- Heffernan, C., and Sidahmed, A (2001):** Issues in the delivery of veterinary services to the rural poor. Paper presented at the conference on the delivery of veterinary services to the poor, June. University of reading.
<http://www.Livestockdevelopment.org>
- Heffernan, C., Misturelli, F., Nielson, L., and Pilling, D (2003):** The livestock and poverty assessment methodology: A toolkit for practioners, reading, UK: Livestock development group, school for Agriculture, policy development, Universtity of Reading.
www.Livestockdevelopment.org/adobedocs/LPA%20manual.PDF.
- Henry, K.C (1999):** currently practised land-use systems in arid lands and their implication on ecology and plant biodiversity in Kenya. In: Proceedings of a PINEP national workshop on sustainable pastoral production systems and environmental securities in the drylands of north-eastern Kenya, held on 14-15 October, Machakos, Kenya.
- Herlocker, D (1999):** Rangeland resources in East Africa: Their ecology and development resource in East Africa: Their ecology and development. GTZ, German Technical Cooperation, Nairobi, Kenya. Pages 1-213
- Hogg, R (1986):** The new pastoralism: Poverty and dependency in Northern Kenya. *Africa*, **56** (3):319-33.
- Hoinville, G., Jowell, R (1978):** Survey Research Practice. London. Sociologische Gids XXVII, **3**, 247-248/Nooij.
- Holden, S., Chema, S (1996):** Delivery of animal health services, Kenya. Interim report/discussion document. Livestock in development. Somerset, Crew Kerne.
www.springerlink.com/index/X76L858621144X16.pdf
Search done on 12th June 2004
- lan, S., William, W (2006):** Livestock, Diseases, Trade and Markets: Policy choices for the livestock sector in Kenya. FAO corporate document repository, Institute for development studies (IDS) working paper number 269, page 53.

Irungu, P., Omiti, J. M., and Mugurieri, L.G (2006): Determinants of farmer's preference for alternative animal health service providers in Kenya: a proportional hazard application. *Agricultural Economics*, volume 35, Number , Blackwel Publishing, pp 11-17 (7), **35**, issue 1 page 11-75.

Isaac, P., Kalua H.S.C (2008): 'Bio-fuel (Jatthropa) and rural development in Kenya.' A report for Kenya, January 2008.

International Fund for Agricultural Development (IFAD) (2004): Livestock Services and the poor: A Global initiative, collecting, coordinating and sharing experiences. A joint report for IFAD, DANIDA, World Bank; DAAS Rome, pages 21-152.

IFAD (2002): The rural poor-survival or a better life? The choice between destruction of resources and sustainable development. A paper submitted by IFADS to the world summit on sustainable development held in Johannesburg, South Africa, 26th August to 4th September.

International Livestock Research Institute (ILRI) (2000): ILRI Livestock strategy to 2010: Making the livestock revolution work for the poor, Nairobi, page 112.

Institute of Policy Analysis and Research (IPAR) (2002). How public policy analysis can improve the situation of Kenya pastoralists. PB, **8**, Issue 3.

Irungu, P., Mugunieri, G.L., and Omiti, J.M. (2006). Determinants of farmer's preference for alternative animal health service provision in Kenya: A proportional hazard application. *Agricultural economics* 35 (3): pages 11-17.

Jean-Francois, B. (2002). International Trade Rules: What every exporter should know. *International trade forum-issue 4*.

John, M. (2004): Livestock marketing in Kenya and Ethiopia: proceedings of a workshop held in Nairobi, Kenya. August 11-13. Edited by John Mcpeak.

John, S., Piers, B., Oliver, S., Matthew, C (2009): Understanding livelihood processes and dynamics: livelihood policy. *Relationships in Southern Asia*. Report for DFID, Working paper 1.

<http://www.cesca-world.org/downloads/understanding%20livelihood%20processes.pdf>.

Julia, M (2001): Human stability and conflict in the Horn of Africa: Published in peace, human security and conflict prevention in Africa, proceedings of the UNESCO-ISS expert meeting held in Pretoria, 23-24th July.

Le Brun, Y (2003): Mechanisms for collaboration between public and private veterinarians: the animal health accreditation mandate. Rev. Sci. tech. Off. int. Eiz, **23** (1), 69-77

Kajume, K.J (1999): Delivery of Animal Health services in ASALs versus high potential areas: status of the ART, in Intermediate Technology Development Group/PARC-VAC/SNV pages 18-22.

Kalim, Q.M (2005): FAO corporate document repository: Modernizing national Agricultural extension systems. A practical guide for policy-makers of developing countries. Research, extension and training division, sustainable development report. FAO of the UN.
<ftp://ftp.fao.org/docrep/fao/008/90219eoo.pdf>
Search done on 11th June 2007

Karanja, A.M (2003): The diary Industry in Kenya: the post-liberalization agenda, Tegemeo agricultural Monitoring and Policy Analysis Project (TAMPA), working paper No. 1, Egerton University/Tegemeo Institute of Agricultural Policy Development (TEGEMEO), Nairobi, Kenya and Michigan State University, East Lansing, USA.
www.aec.msu.edu/fs2/kenya/0_papers/dairy_sector_color.pdf
Search done on 10th April 2005

Kariuki, D.P., and Letitiya, W (1999): Livestock production and health challenges in pastoral areas: Samburu District. Kenya Agricultural Research Institute (KARI), page 59.

Kathiravan, G., Thirunavukkrasu, R., Arumugam, R., and Manivannan, C (2009): Demand for public versus private livestock services in South India: a double handle analysis. India J. sci. Technol, **2**, issue 2, pp: 55-62

Kabubo-Mariara, J (2003): The linkages between property rights, migration, and productivity: the case of Kajiado District, Kenya. Department of economics, University of Nairobi.
www.cababstractsplus.org/abstract/Abstract.aspx?Acno=20033199575
Search done on 10th April 2005

Kenya **Food Security Steering Group (KFSSG) (2005):** Kenya long rains assessment report. Government printer, Nairobi.
www.kenyafoodsecurity.org/mod.php?topic=76
Search done on 12th August 2007

Kenya **National youth policy (1997):** Ministry of home affairs, heritage and sports. Governemnt printers, Nairobi, Kenya.

Kenya **Veterinary Assiciation Privatization Scheme (KVAPS) (1998):** Privatization of veterinary services in the ASAL areas. 1998 Annual report, Nairobi.

Kenya **Veterinary Board (2003):** Minimum standards and guidelines for training Community-based animal health workers in Kenya. Uthiru, Kenya: Kenya Veterinary Board.

Kitalyi, A., Mewbaze, S., Muriuki, C.M., Mutagwaba, M.M., and Lungu, O (2006). The role of livestock in integrated land management: KELMA's experience in Eastern and Southern Africa. Working paper No.25. World Agro- forestry Center.

Kitching, R.L. (2000). OIE list A diseases as a constraint to international trade: Annals of the New York Academy Sciences. Vol 916 issue ' Tropical Veterinary Diseases: Control and prevention in the context of the new world order', pages 50-54.

Kirsch, B., Skorge, S., and Khumalo, N (2004). Zooming in on Zulu. A phrasebook - and much more. David-Philiph publishers, Claremont.
ww.prolinnova.net/South_Africa/communal_grazing.doc
search done on 20th July 2006

Kleemann, G (1997). Concepts of efficiency in the delivery of livestock services. In: FAO-GTZ, 1997: Proceedings of the workshop on the systematic improvement of the efficiency of public and private livestock services in Asia. Bangkok, Thailand, 22-26 April 1996. RAP publication 1997/9. FAO, Regional Animal Production and Health Commission for Asia and the Pacific (APHCA), Bangkok, Thailand.

Kleemann, G (ed) (1999). Service management in livestock development. GTZ Schriftenreihe No 267. Universum Verlag Wiesbden, Germany.
www2.gtz.de/dokumente/bib/04-5313.pdf
Search done on 20th July 2006

Koma, K.M (2000). Can private veterinarians survive in Uganda? In Africa's changing markets for health and veterinary services: The new institutional issues. Palgrave Macmillan, Basingstoke, pp145-167

Krishna, A., Kristjanson P., Radeny M., Nindo, W (2004). Escaping poverty and becoming poor in twenty Kenyan villages. Journal of human development, 5 (2): 211-226.

Kristjanson P., Krishna A., Radeny M., Nindo, W (2004). Pathways out of poverty in Western Kenya and the role of livestock. Food and agriculture Organization, pro-poor livestock policy initiative working paper 14, FAO Rome. www.fao.org/ag/aqainfo/projects/en/ppl/prodt-docs.html
Search done on 20th July 2006

Kristjanson P., Swallow, B.M., Rowlands, G.J., Kruska, R.L., De Leeuw, P.N. (1999). " Measuring the costs of African animal Trypanosomosis, and returns to research" *Agricultural systems* 59, 79-98

Krugmann, H (1996). Towards improved indicators to measure desertification and monitor the implementation of the desertification convention. In: Hambly, H. and T.O. Angura (EDs). Grassroots indicators for desertification: Experience and perspectives from Eastern and Southern Africa. International development research center (IDRC).
www.informaworld.com/index/713762208.pdf
Search done on 11th June 2007

Laura, J., Claire, H., Ahmed, E.S (1999). Livestock and range lands: IFAD and the delivery of veterinary services to the rural poor. IFAD technical advisory division. pages 1-15.

Leeuwis, C., Van Den Ban, A (2004). Communication for rural innovation: Rethinking agricultural extension (3rd edition). Wiley-blackwell Publishing, Science/CTA, Oxford/Wageningen. Pages 1-424

Lenemiria, D., Mutavi, S.O., Ochieng, T (2005). Long rain assessment, Baringo District. 13th – 15th July. Government printers, Nairobi.

Leonard, D.K (1991). African success: four public managers of Kenya rural development. Berkley: University of California press, Berkeley, Los angles, and Oxford.
<http://ark.cdlib.org/ark:/13030/ft8p3008fh/>
Search done on 11th June 2007

Leonard, D.K (1991). Africa's changing markets for health and services: The new institutional issues, Palgrave Macmillan, Basingstoke, pages 260-292.

Leonard, D.K (1993). Structural reform of the veterinary profession in Africa and the new institutional economics, development and change, **24**, pages 227-267.

Leonard, D.K., Koma, L.M., Ly, C., Woods, P.S (1999). The institutional economics of privatizing veterinary services in Africa. *Revue Scientifique et Technique Office International des Epizooties*, **18**:544-561.

Leonard, D.K (2000). The new institutional economics and the restructuring of animal health services in Africa: the new institutional issues, Palgrave Macmillan, Basingstoke, pp 1-39

Leonard, D.K (2000). Africa's changing markets for health and veterinary services: The new institutional issues. New York, NY: Saint Martin's press; INC page 1-320.

Leonard, D.K (2004). Tools from the new institutional economics for reforming the delivery of veterinary services. *Rev. Sci. Tech.Off. int.Epiz.*, **23** (1), 47-57.

Levy, P.S., Lameshow, S (1996). Linear Algebra and its applications. 237- 238, pages 225-238. Elsevier Science Inc.

Leyland, T., Akabwai, D., Mutungi, P.M (1999). Delivery of private veterinarians supervised Community Based Animal Health services to Arid and Semi-arid pastoralists areas of the greater horn of Africa. Are they viable and sustainable options?. Proceedings of a workshop held in December, in Arusha, Tanzania, on 'Delivery of animal health services in Eastern Africa'

Little, Peter D., Smith, Cellarious, B., Coppock, B., Coppock, C., and Barret, B (2001): Avoiding disaster: Diversification and Risk Management among East African herders. *Development and change*, **32** (3) 401-433.

Little, Peter D., Tegegne Teka., and Almaychu, Azeze (2001): Cross-border livestock trade and food security in the Horn of Africa: an Overview. A research report of the Broadening Access to Markets and Input Systems-collaborative Research Support Program (Basis-CRSP) and OSSREA project on Cross-Border trade and Food Security in the Horn of Africa. Madison, WI: Land tenure Center, University of Wisconsin.

[www.fao.org/.../LITTLE final Cross Border Trade food SEC FAO FINAL may9 2007.pdf](http://www.fao.org/.../LITTLE%20final%20Cross%20Border%20Trade%20food%20SEC%20FAO%20FINAL%20may9%202007.pdf)

Search done on 12th April 2008

Lwanga, S.K., Lameshow, S (1991): Sample size determination in wealth studies: A practical manual. Geneva, World Health Organization.

[lje.oxfordjournals.org/cgi/reprint/20/4/1148.pdf](http://je.oxfordjournals.org/cgi/reprint/20/4/1148.pdf)

Search done on 12th April 2008

Madalla, G.S (2001): Introduction to econometrics. 3rd edition. MacMillan, New York. Pages 1-664

Makonennen, A (2007): Industrializing Africa: Development options and challenges for the 21st century, Amazon page 87.

Manhound, H.A (2001): Livestock trading and trader networks in Northern Kenya and Southern Ethiopia. Research brief 01-06-PARIMA. Global livestock collaborative research support programme (GL-CRSP), University of California, Davis.

Glcvsp.ucdavis.edu/projects/project_subpapers/PRMP.../PARIMA6.pdf

Search done on 12th April 2008

Mango, N., Cheng'ole J., Kariuki, G., Ongadi, W (2004): Social aspects of Dynamic poverty Traps: Cases from Vihiga, Baringo and Marsabit districts, Kenya. Paper presented at KIPPRA-Cornell-SAGA workshop on Qualitative and Quantitative methods for poverty analysis on Thursday 11 march, in Grand Regency hotel, Nairobi, Kenya.

Mariama, W (2004): United Nations research institute for social development: structural adjustment, trade liberalization and women's enjoyment of their economic and social rights. Yvonne

[www.pg.coc.org/system/files/economic social rights_1.pdf](http://www.pg.coc.org/system/files/economic_social_rights_1.pdf)

Search done on 5th October 2007

Marriner, J.C., Paskin, R (2000): Participatory epidemiology: Methods for the collection action-oriented epidemiology intelligence. Food and agricultural organization (FAO) Animal Health Manual, No. 10. FAO, Rome, pages 1-81.

Marinda., P.A., Heidhues, F (2004): Gender discrimination and its impact on food and nutrition security in Kenya-A case study of West Pokot District. Paper presented during a workshop on 'Ruaral poverty reduction through research for development, held on 5th – 7th October, Berlin, German.

McPeak, J (2003): Contrasting income shocks with asset shocks: Livestock sales in northern Kenya. Oxford Economic Papers. S6: 263-284

McCorkle, C.M., and Mathias, M. (1992): Ethnoveterinary medicine in Africa. Africa 62, pages 59-63.

McCorkle, M (1997): Contribution to FAO electric conference (January-March): Principal for rationing delivery of public and private veterinary services.
www.fao.org/docrep/X3770t06.htm
Search done on 6th March 2006

Melinda, C., Hans, H., Jeremy, M., Jane, M (2006): National Agriculture and livestock extension programme (NALEP): Phase I impact assessment. SIDA evaluation 06/31. Department for Africa.
www.oecd.org/dataoecd/54/19/38126205.pdf

Miaron,O.J., Kassim, O.F., and Wellington, N.E (2004): Indigenous knowledge: The basis of the Maasai Ethnoveterinary diagnostic skills. Journal of Human Ecology, 16 (1):43-48.

Ministry of livestock development (2009): Budget for the fiscal year 2008/2009. Pages 7-24

Mkutu, K.A (2008): African issues: Guns and governance in the Rift valley: Pastoralists, conflict and small arms. Indiana University Press. Pages 1-200
<http://www.safeworld.org.uk/images/pubdocs/weblaikipia.pdf>

Mogues, T (2006): Shocks, livestock asset dynamics and social capital in Ethiopia: DSGD discussion papers 38, International Food Policy Research Institute (IFPRI).

Mohamud, A., and Ruto, P.K (2005): Closed to progress: An assessment of the socio-economic impact of conflict on pastoral and semi-pastoral economies in Kenya and Uganda. Practical action-eastern Africa pages, 1-89.

Monteiro, A.M., Wanyangu, S.W., Kariuki, D.P., Bain, R., Jackson, F., Mckeller, O.A (1998): Pharmaceutical quality of anthelmintics sold in Kenya. The veterinary record, 142, issue 15, pages 396-398.

Moural, J.A., Bedoya, M., Agudelo, M.P (2004): Relations between official and private veterinary services in epidemiology and the control of contagious diseases. Rev.Sci.tech.Off. Int.Epiz, 23 (1), 79-93.

Mugunieri, G.L., Irungu, P., and Omiti, J.M (2004): Performance of community based animal health workers in the delivery of livestock health services. Tropical animal health and production; Sprenger Netherlands, Vol 36, number 6, pages 523-535.

**Mugenda, O.M., Mugenda, A.B (1999). Research methods: Quantitative and Qualitative approaches. African Center for Technology Studies (ACTS). Nairobi, Kenya.
Weblis.bioline.org.br/pdf?1p08001
Search done on 6th March 2006**

Mulwa, F.W., and Nguluu, S.N(2003). Participatory Monitoring and Evaluation: A strategy for organization strengthening. Eldoret, Kenya: Participatory community development series no. 10 : Zapf chancery, Nairobi: PREMESA-Olivex. Pages 38-42; 52-64; 99-113.

Munyua, S.J.M, Mbai, K.M., Kariuki, D.I., Chibeu, D.M. (1998). Indigenous knowledge and the use of medicinal plants in small ruminant theriogenology in arid and semi-arid areas of Kenya. The African Pastoral Forum, 17: 1-14.

Munyua, S.J.M, Mbai, K.M., Kariuki, D.I., Chibeu, D.M (1998): Reproductive performance and wastage in goats in arid and semi-arid areas of Kenya. Proceedings of the Kenya Veterinary Association scientific conference, Whitsands, Mombasa, Kenya, April.

Munyua, S.J.M., Kahiu, I.G (1999) Can the veterinary education curriculum and the provision of veterinary services evolve with time or resist change? The Kenya Veterinarian, 24: 15-17

Munyua, S.J.M., Farrah, K.O. and Wabacha, J.K. (1999) Alternative veterinary service delivery systems in the arid and semi-arid areas of Kenya: Suggested structural, policy and legal amendments. *In sustainable production systems and environmental securities in drylands of northern Kenya*. Eds Nyariki, D.M. and Farrah. K.O, Pages 79-95

Munyua S.J.M., Wabacha, J (2003): Community based animal health in Kenya: Kenya's experiences in re-engineering its structural, policy and legal framework. In *Community animal health workers: Threat or opportunity?* Publi. The IDL Group, pages 135-148

Muyanga, M (2008): Household vulnerability to transient and chronic poverty: Evidence from rural Kenya. Paper presented in ninth annual conference of Global Development Network (GDN), 29th-31st January, Brisbane, Australia.

Mpyisi, E (2007): Comprehensive Agricultural Development Program (CAADP): "Unleashing agricultural potential". African journal, Washington D.C.
<http://craigelsele.wordpress.com>
Search done on 11th June 2008

Myerhoff, M (2008): Taking stock: changing livelihoods in an Agropastoral community. African center for technology studies (ACTS) press, Nairobi and Biomass Users Network, Harare.

Ndeso-Atanga, S (2000). Healthcare quality and the choice of care providers in rural Cameroon 'in Leonard (2000a), chapter 5.

Ngowi, E.E., Chenyambuga, S.W., and Gwakisa, P.S. (2008). Socio-economic values and traditional management practices of Tarime Zebu cattle in Tanzania. *Livestock research for rural development*, 20 (6).

Niamir, M (1994). Natural resource management at local-level: In *pastoral natural resource management and policy; proceedings of the subregional workshop held 6-10 December, in Arusha, Tanzania*.

Njau, P.M. (2008). "Livestock trade, export, and certification in pastoral areas of Kenya". Paper presented during a SOLICEP inception workshop held at Addis Ababa, Ethiopia, 21st -23rd April.
http://www.au-ibar.org/documents_public/solicepinception%20kenya.pdf.

- Nyariki, D.M., Wiggins, S.L., and Imungi, J.K (2002): Levels and causes of household food and nutrition insecurity in dryland Kenya. *Ecology of food and nutrition*, **41**:155-176.
- Nyariki, D.M., Ngugi, R.K (2002). A review of African pastoralists production system: *Approaches to their understanding and Development*. *Journal of Human Ecology*, **13** (3): 137-250.
- Nyariki D.M (2009): Household data collection for socio-economic research in agriculture: approaches and challenges in developing countries. *Journal of Social Sciences*, **19** (2): 91-99.
- Oba, G., Lusigi, W (1987): An overview of drought strategies and land use in africanpastoral systems. Paper 23a
<http://www.odi.org.uk/pdn/papers>
 Search done on 11th June 2008
- Oakeley, R.D (1999): Community livestock workers: A review of experiences with community based animal health care delivery. *World anim. Rev*, **92**: pages 47-54.
- Odimegwu, C.O (2000): Methodological issues in the use of focus group discussions as a data collection tool. *Journal of social Sciences*, **4**(2-3): 207-212.
- OIE Terrestrial code (2009): Guidelines for the evaluation of veterinary services, chapter 1.3.4, article 1.3.4.1.
- Okuthe, O.S., Kuloba, K., Emongor, R.A., Ngotho, R.N., Bukachi, S., Nyamwaro, S.O., Murila, G., Wamwayi, H.M (2003): National Agricultural Research systems experiences in the use of participatory approaches to animal health research in Kenya. In: *Primary animal health care in the 21st century: Shaping the rules, policies and institutions*. Proceedings of an international conference (K. Sones and A. Catley, eds), 15-18 October 2002, mombasa.
- Okwiri, Kajume, J., Odondi, R.K (2001): Animal health case study: 'An assessment of the economic viability of private animal health service delivery in pastoral areas of Kenya'. A study commissioned by the CAPE project of AU/IBAR, Global providers International Ltd, Nairobi.

Otwande, J (2009): The results of a situational analysis of maize production in the country conducted by Tegemeo: In proceedings of a roundtable discussion on Kenya's food situation, challenges and opportunities, held at Laico Regency hotel, Nairobi, on 18th September.
www.gec.msu.edu/fs2/kenya/Maize_Round_TableProceedings.pdf

Omiti, J.M., and Irungu, P (2002): Institutional and policy issues relevant to pastoral development in Kenya. Discussion paper No. 3. Institute of policy analysis and research, Nairobi, page 33. ISBN 996 948-14-7.
http://www.ipar.or.ke/DP_31.htm

Omiti, J.M., and Irungu, P (2002): How public policy can improve the situation of Kenyan pastoralists. IPAR policy brief, 8, issue 3, page 4
<http://www.ipar.or.ke/pb3>

Omiti, J., Otieno., Nyanamba, T., McCollough, E (2009): Factors in influencing the intensity of market participation by smallholder farmers: A case study of rural and peri-urban areas of Kenya. Afjare, 3, No 1 March.

Omore, A.O., McDermontt, J.J., Staal, S., Arimi, S.M., Kang'ethe, E.K., Ouma, E.A (1997): The role of membership organizations and the gap they fill in private veterinary services delivery. (FAO electronic conference on principles for rational delivery of public and private veterinary services, 2/3-20 January. Principles paper I).

Ongom, O (2001): NGO perspective on CAHW-HCP. In: proceedings of a workshop on animal health service delivery in pastoralists areas held in Eneku training village, Soroti, Uganda, 4th -6th September. Pages 67-70.

Oruko, L.O (1999): Delivery of animal health services in Kenya. PhD. Thesis. Department of Agricultural and Food Economics, University of reading

Otte, M.J., Nugent, R., and McLeod, A (2004): Transboundary animal diseases: assessments of socio-economic impacts and institutional responses,' Livestock policy discussion paper No.9, livestock information and policy branch, Food and Agricultural Organization of the United Nations, Livestock information and policy branch, AGAL. (FAO), Rome.
http://www.fao.org/ag/againfo/resources/en/publications/sector_discuss/pp_Nr_9_Final.pdf

Search done on 4th April 2008

Owen, E., Kitalyi, A., Jayasuriya, N., and Smith, T (2005): Livestock and wealth creation: Improving the husbandry of animals kept by resource-poor people in developing countries, Nottingham: Nottingham University press, Pages 1-601.

Panjani, K., Paul, V., Espen, S (2009): Forest incomes and rural livelihoods in Chiradzulu District. *Ecological economics*, 68 (3): 613-624.

Perry, B. D., McDermontt, J.J., Randolph, T.F., Sones, K.R., and Thornton, P.K. (2002): Investing in animal health research to alleviate poverty: animal healthcare as a strategy for poverty reduction. International Livestock Research Institute (ILRI). Nairobi, Kenya, Page 133.

Perry, B., Nin Pratt, A., Sones, K., and Stevens, C (2005): An appropriate level of risk: balancing the need for safe livestock products with fair market access for the poor, PPLPI working paper No. 23, Food and Agricultural Organization (FAO) Rome. www.fao.org/ag/againfo/projects/en/pplpi/docaxc/wp/23.pdf.
Search done on 4th April 2008

Perry, B., Randolph, T.F., Omore, A., Perera., and Vatta., A. (2005). Improving the health of livestock kept by the resource-poor in developing countries. In *livestock and wealth creation: Improving the husbandry of animals kept by resource-poor people in developing countries*. Nottingham University press, Nottingham, UK. Pages 233-261.

Peters, P. (2002). Grounding governance: Power and meaning in natural resource management. In: *Contested resources: challenges to the governance of natural resources in Southern Africa*. TOR Arie Benjamin, Ben cousins and Lisa Thompson, editors. PLAAS school of Government, University of the Western Cape press.
Jed.sagepub.com/egi/content/refs/17/2/99
Search done on 4th April 2008

Peter, D.L., Smith, K., Cellarius, B., Coppock, D.L., Barret, C.D., Layne, C., Christopher, B.B (2001): Avoiding disaster: Difersification risk management among East African herders. *Development and change*. 32:401-433

Peter, L., John, M., Chris, B., and Patti, K (2006). Pastoralism and poverty reduction in East Africa. Paper presented in a policy Research Conference held on 27th -28th June, at the Safari Park hotel, Nairobi, Kenya.

Schelling, E., Wyss, K., Bèchir, M., Moto, D.D., Zinsstag, J (2005): Synergy between public health and veterinary services to deliver human and animal health interventions in rural low income settings.
<http://www.bmj.com/cgi/content/full/331/7527/1264>.
Search done on 12th July 2009

Schultz, T.W (1990): Investing in people. In: Eicher, C.K.S., J.M. (ed), Agricultural development in the third world. The John Hopkins University press, Baltimore, pages 2800-289.

Schwabe, C.W (1984): FAO corporate document repository: Manual of participatory epidemiology: participatory epidemiology in contwext.
<http://www.fao.org/docrep/003/x8833e02.htm>

Scoones, I., and Wolmer, W. (2006): Livestock diseases, trade and markets: policy choices for the livestock sector in Africa. Institute of development studies (IDS), working paper No. 269.

Service management in livestock development, concepts and elements (1997):
Publ. by Deutsche gessel for Technische Zusammenarbeit (GTZ0 GmbH. Gunter Kleeman (ED)-Wies baden: Universum-Vert Anst., (Schriftenreihe der GTZ: No. 267)
www.pastoralpeoples.org/docs/eg10summarybib.pdf
Search done on 12th July 2009

Shiferaw, B., Holden, S.T (1998): Resource degradation and adoption of land conservation technologies in the Ethiopian highlands: A case study in Audit Tid, North Shewa. Agricultural economics, **18**: 233-247.

Sikana, P.M., Kerven, C.K., Behnke, R.H (1993): From subsistence to specialized commodity production: Commercialization and pastoral dairying in Africa. ODI, pastoral development network's research programme on change in pastoral Africa.
www.fao.org/docrep/W2650T/W2650t02.htm
Search done on 11th July 2007

Sindiga, I (1987). Fertility control and population growth among the Maasai. Human ecology, **15**: 53-66.

Sollod, A.E., Stem, C (1991): Appropriate animal health information systems for nomadic and transhumant livestock populations in Africa, *Rev Sci Tech Off int epiz.* **10:** 89-101.

Solomon, A., Workalemahu, A., Jabbar, M.A., Ahmed, M.M., and Belachew, H. B. (2003): Livestock marketing in Ethiopia: A review structure, performance and development initiatives: Socio-Economics and Policy Research working paper 52, Nairobi: International Livestock Research Institute (ILRI).

www.ilri.org/infoServ/webpub/Fulldocs/wp552/Toc.htm

Search done on 12th July 2009

Solomon, B., De Leeuw, P.N., Grandin, B.E., and Neate, P.J.H. (eds) (1991): Maasai herding: An analysis of the livestock production systems of maasai pastoralists in Eastern Kajiado District, Kenya. Systems study 4, KCA, International Center for Africa, Addis Ababa, Ethiopia, page 154.

Sones, K. and Cartley, A (2002): Primary animal healthcare in the 21st century: Shaping the rules, policies and institutions. Paper presented during a **CAPE Unit**, PACE programme International conference held in Mombasa, Kenya, 15th-18th October.

Spielman, D.J. (2009). Public-private partnerships and pro-poor livestock research: The search for an East Coast Fever vaccine. "Enhancing the effectiveness of sustainability partnerships, summary workshop", page 78.

Stem, C., Sode, I.O (1999). Towards sustainable human and animal health care. Care for the underserved areas of Moyale, Marsabit, and Samburu districts. A final report for FARM Africa and GTZ.

Repository.forcedmigration.org/pdf/?pid=fmo:1752

Search done on 1st March 2004

Sternstem, M (1996): Statistics (College Review Series. Mathematics). Barron's educational series, INC, pages 3-59.

Stock, J.H and Watson, M.W. (2003). Introduction to econometrics. Addison-Wesley, higher education group publishers. James Curry, Oxford.

www.osun.org/stock+watson+introduction+to+econometrics+solution-doc.html

Search done on 1st March 2004

Sustainable development timeline (2009): Participatory research for sustainable livelihoods: A guide for field projects on adaptive changes.
<http://iisd.org/CASL/CASLGuide/Ecosystemapproach.htm>

Talle, A (1999). Pastoralists at the border: Maasai poverty and development discourse in Tanzania. In: D.M. Anderson and V. Broch-Due (Eds). The poor are not us: Poverty and pastoralism in Eastern Africa.
www.cababstractsplus.org/abstracts/Abstract.aspx?AcNo=20013145467
Search done on 1th March 2004

Tambi, E.N.M., Mukhebi, A.W., Maina, O.W., and Solomon, H.M (1999). Probit analysis of livestock products demand for private veterinary services in the high potential agricultural areas of Kenya. *Agricultural systems*, **59**, issue 2, February, pages 163-176.

Thornston, P.K., Kruska, R.L., Henninger N., Kristjanson P.M., Reid R.S., Robinson T.P (2003). Locating poor livestock keepers at the global level for research and development targeting. *Land Use Policy*, **20** (4), pp 311-322.

Tudor, D. T., Williams, A (2004). Development of a 'matrix scoring technique' to determine litter sources at a Bristol Channel Beach. *Journal of Coastal Conservation*. Article: pp.119-127.

Turkson, P.K (2009). Clients satisfaction with delivery of animal health-care services in prei-urban Ghana. *Preventive veterinary medicine*. Elsevier, **90**, issues 3-4, pages 153-159.

Uganda Veterinary Association (2005). Proceedings of the joint Uganda Veterinary Association and the faculty of veterinary medicine. Klumer Academic/Plenum publishers New York, pages 617-646

Ulrike, J.L., Haja, N (2006). Pastoralism and poverty reduction in East Africa: A policy research conference organized by ILRI, 27th-28th, Safari Park hotel, Nairobi, Kenya.

Umali, D., Feder G., Haan, C (1992): "The balance between public and private sector activities in the delivery of livestock services, " World Bank Discussion paper No. 163. The World Bank, Washington, D.C, page 144.

B4 Distance of the household from the main road

2. How long does it take to the main road? Less than 5 hours B. 5-10 hours C. A day D. More than a day

3. How do you get to the main road? Walking B. On animals C. By public transport D. Others (specify)

B5 Distance of the household from the nearest market (in hours)

4. How long does it take you to the nearest market? A. Less than 5 hours B. 5-10 hours. C. A day D. More than a day

5. How do you get there? A. Walking B. On animals C. By public transport D. Others (specify)

Distance of the household from the nearest extension agent (in hours)

6. How far is your nearest extension agent? A. Less than 5 hours B. 5-10 Hours C. over 10 hours

7. How often does the extension agent visit your village? A. Quite often B. Rarely C. Not at all

8. Do you visit him or her for advice? Yes B. No

9. How do you get there? A. Walking B. On animals C. By public transport D. Others(specify) E. Not applicable

B6. Does the household have the following?

ASSET	YES/NO	QUANTITY	VALUE
VEHICLE			
BICYCLE			
TV			
RADIO			
ELECTRICITY			
KEROSINE LAMP			
PRESSSURE LAMP			

SECTION C. POVERTY INDICATORS

INCOME

10. What are the main sources of your income for the last year?

A. Salaried employment B. Crop farming C. Livestock D. Mixed farming E. Fishing F. Mining G. Cutis

C1 Household monthly income

How much do you get from the following?

SOURCE	AMOUNT PER MONTH	AMOUNT PER YEAR	VALUE
Labor employment			
Crop farming			
Livestock/pastora list			
Mixed farming			
Aid			
Gold			
Rubi			
Cutis			
Milk			
Other(explain)			

C2 Rank your sources of income in order of their priorities

(i)

(ii)

(iii)

(iv)

(v)

C3. How much do you spend per year on the following?

COMMODITY	QUANTITY SPENT PER MONTH/OCCASION	AMOUNT SPENT PER MONTH	AMOUNT SPENT PER YEAR	%OF INCOME SPENT
Household food(maize)				
Education				
Household health (medical bills)				
Initiation(female circumcision)				
Livestock drugs and acaricides				
Marrying off daughters where applicable				
Marring new wife for ones self (where applicable)				
Getting a wife for the son				
Savings				
Investment	Irrigation/water related			
	Shelter			
	Buying livestock			
	Other(specify			

EDUCATION

11. Have you received any training? A. Yes B. No

If yes, specify.

Kind of education	YEARS
Formal education	
Adult classes	
Extension training	
Training by NGOs	
Other(specify)	

How far is the nearest school?

Distance(walking)	Primary school.	Secondary school.	High school
Less than 30 minutes			
1 hour			
2 hours			
Other(specify)			

12. Do you have any access to TV? A. Yes B. No

13. Do you have any access to radio? Yes B. No

14. Do you have any access to satellite TV? A. Yes B. No

15. Do you have access to telephone? A. Yes B. No

HEALTH

16 How far is the nearest health service? A. Less than 5 km B. 6-10 km C. 11 to 20 km D. More than 20 km

17 How do you access the health service? A. Through walking B. By animals C. By vehicles

18 Do your household members go to doctor when they get sick? A. Yes B. No

If no, give the reasons:

19 How often does your household visit a doctor? A. Once in a month B. Once in every six months D. Once every year E. Never F. Only when one is sick

20 Do you use traditional medicine? A. Yes, most of the time B. Yes, always C. No

C6 Have lost any of your relatives from the following disease conditions

DISEASE	SEX	NUMBER
HIV		
MALARIA		
HIV		
Other(specify)		

11. When was the last time a member of your family was sick? A. A week ago B. Weeks ago C. Months ago D. A Year ago E. Cannot remember

12. What was he suffering from? A. Diarrhea B. Malaria C. Respiratory diseases

Other (specify).....

13. What action was taken? A. Taken to hospital B. Taken to traditional healer C. recovered on their own D. Self treatment

14. How far are the nearest dispensary/ hospital from here? A. Less than 5 km B. 6-10 km C. 10-20 km D. More than 20 km

15. How do you access the hospital/dispensary? A. On foot B. By bicycle C. Do not access it at all

16. Do the women have access to the pre and post natal health care? A. Yes B. No

17. Do you pay for the services at the dispensary A. Yes B. No

18. Are you always able to meet the hospital bills? A. Yes B. No

19. How do you describe your health services? A. Good B. Fair C. Poor

Access to water

30. Does your access clean drinking water? A. Yes B. No
31. Who fetches water for the domestic use? A. Women B. Man C. Sons D. Daughters E. Daughters and mothers
32. How much time in a day do you spend collecting water during the dry season? A. 1-2 hours B. 3-4 hours C. More than 4 hours
33. How far do you get water from during the dry season? A. 1-4 km B. 5-10 km C. More than 20 km
34. How much water does a woman carry per turn? A. 5 litres B. 10 Litres C. 20 Litres
35. What is the source of your drinking water during the dry season? A. Borehole B. River C. Rain water D. Ponds
36. How far do you get water from during the wet season? A. 1-5 Km away B. 6-10 Km away C. 11-20 Km away D. More than 20 km away
37. Do you wash your hands before eating? A. Yes, sometimes B. Yes, always C. No
38. How often do you wash your hands? A. Quite often B. Often C. Not at all

39 How much water does your family spend per day? A. Less than 10 litres B. 10-20
Litres C. 20 Litres D. More than 20 litres

C7. Rank uses of water in order of their priorities

i

ii

iii

iv

v

ACCESS TO SANITATION

40. How many windows do you have in each of your huts? A. One B. Two C.
Three D. None

41. How many toilets do you have in your compound? A. 1 B. 2 C. None

42. What type of the toilets are they? A. Flush B. Improved pit latrine C.
Traditional latrines D. None

43. Are the toilets connected to a sewer system? A. Yes B. No

44. What are the reasons of not having toilets in your compound? A. Customary practices
B. Land unavailability C. Always on the move D. Toilet not necessary
45. What source of fuel do you use for cooking? A. Firewood B. Clean stoves C.
Gas D. Charcoal E. Dung F. Crop residue
46. Does any family member sleep in the cooking place during the dry season? A. Yes B.
No
47. Does any family member sleep in the cooking area during the wet season? A. Yes
B. No
48. Who sleeps in the cooking place? A. Parents B. Children C. Workers
D. Visitors E. All family members
49. Do young goats, calves and sheep sleep in the kitchen? A. Yes B. No
50. Have you or any of your family members suffered from malaria in the last two months?
A. No B. Yes
51. Does any of your family members use mosquito nets? A. Yes B. No
52. Which members of your family use mosquito nets? A. Children B. Parents C.
Old people D. Pregnant women E. None

Poverty and self awareness

53. Do you consider yourself poor? A. Yes B. No

54. If yes, how much poor? A. Little B. Medium C. High D. Very high

Why do you think you are poor? Explain

Why do you think you are not poor? Explain

Do you expect your status to change? A. Yes B. No

If no, explain

Social status

C8. What responsibilities do you have in your village?

- A. Leader in the village government
- B. Village government committee leader
- C. Village peace committee leader
- D. Religious leader
- E. Retired civil servant

- F. Village elder
- G. Member of the village land use planning committee
- H. Leader of water user group
- I. Other (specify)

Social capital indicators

55. Do you incur any debts in terms of money or livestock? A. Yes B. No

56. Are you able to give or loan livestock? A. Yes B. No

59. Do you have any organizations in this village? A. Yes B. No

What kind of activities are the organizations working on this village?

- 1. Water management
- 2. soil management
- 3. Crop production
- 4. Religious
- 5. Crop production
- 6. livestock production
- 7. Health services
- 8. Education services
- 9. Peace initiatives
- 10. Others(specify)

Indicators of motivation for livestock keeping

This will be done to obtain a notion of an individual preferred livelihood.

1. What livelihood activities are you involved in?
2. Out of your daily activities which one do you prefer?
3. What roles does livestock play in your present activities?
4. How would you describe yourself?
5. What person do you admire, and what do they do?

SECTION D: COMPOUND MAPPING

57. What materials make the outer walls and roofs of the hut? A. Strong materials B. Weak temporary materials
58. What kind of a family lives in this compound? A. A single family (mother, father and the children) B. An extended family C. Multi house-hold families (family, relatives and friends)
59. How many people live in the compound? A. One B. Two C. More than three

60 What is the ownership of your livestock? A. Individually owned B.
Communally owned

61 What can you say about the security of your livestock? A. Secure B.
Insecure

62 How is the land ownership? A. Communal B. Individual

63 What can you say about the security of the land? A. Secure B. Insecure

SECTION D: FOOD SECURITY

64 How many meals do you have per day? A. One B. Two C. Three

65. Are the meals you take always enough? A. Yes B. No

66. What can you commend about the food availability and the state of the hunger in this area? Is sufficient? A. Yes B. No

67. Is food easily available? A. Yes B. No

D1 List your food sources in order of priority

68. Are there any convenient roads to the markets? A. Yes B. No

69. Are you able to access food markets during the rainy season? A. Yes B. No

70. Do you always have enough money to buy food? A. Yes B. No

71. How far is your nearest food market? A. 5 Km away B. 6-10 Km away C.
11-20 Km away D. More than 20 km away

72. How do you access the markets? A. By walking B. Mechanized transport

73. Do you always get the types of food you want from the markets? A. Yes B.
No

74. Give reasons why you cannot have three meals per day. A. Food not enough B.
One meal is enough for us C. Two meals are enough with us D. I'm away from
home most of the time

75. Do you consider your food supplies sufficient? A. Yes B. No

D2. What do you feed during the dry season?

ii.

D3 What do you feed on during the rainy seasons?

- 1.
- 2.
- 3.
- 4.
- 5.

D4 List the types of food you get from the forest:

- 1.....
- 2.....
- 3.....
- 4.....
- 5.....

D5 Which are most five crops you grow for livelihood security? (In order of priority)

- 1. Food []
- 2. Cash earning []
- 3. Animal feeding []
- 4. Poultry []
- 5.

16. What is the most important use of each of the five crops you have just mentioned?

- 1.
- 2.
- 3.
- 4.
- 5.

76. Do you get any food from the fisheries? A. Yes B. No

77. How much food stuff per year do you get from fisheries? A. Enough B. Not enough

106. In which pattern do you grow the above crops?

1. Rotation
2. Intercropping
3. Mono-cropping
4. Relay cropping

78. Which seasons to get most of the food? A. Wet B. Dry season

79. What do you describe market prices for food? A. Stable B. Fluctuating

80. What proportion (%) of household income comes from the livestock? (Proportion pilling to be done)

- A. 80-100 B. 50-79 C. 25-49 D. Below 25

XL Do you have any access to irrigation? A. Yes B. No

SECTION E: HERD STRUCTURE

E1. Livestock ownership

TYPE	NUMBER
<ul style="list-style-type: none"> <input type="radio"/> Cows in milk <input type="radio"/> Dry cows <input type="radio"/> Heifers <input type="radio"/> Calves <input type="radio"/> Bulls 	
SHEEPS	
GOATS	
CAMELS	
DONKEY	
CHICKEN	
OTHER	

E2. Which are the most important five types of animals you keep for your livelihood security (in order of priority)?

- 1.....
- 2.....
- 3.....
- 4.....
- 5.....

E4 In which means do you keep the animals

- 1 Free range grazing []
- 2 Semi intensive grazing []
- 3 Intensive grazing []
- 4 Other (specify) []

E5 What are the reasons for practicing the method you have just indicated?

- 1.....
- 2.....
- 3.....

E2. Do you practice transhumance? A. Yes B. No

E6. If so give reasons for practicing?

- 1.....
- 2.....
- 3.....

E4 Where do you get information regarding livestock prices from? A. Area chief

C. CBAHW C. Radio F. Information not available

87. How do you get the above information? A. Barazas B. Workshops C. Neighbors
D. Radio E. Information not available

88. How far do you graze your animals during the dry season? A. 5 Km away B. 6-10
km away C. 11-20 km away D. 21-40 E. More than 20 km away

89. Are the pastures reliable during the dry season? A. Yes B. No

90. How far do you graze your animals during the rainy seasons A. 5 Km away B. 6-
10 Km away C. More than 20 km away

91. Are the pastures reliable during the dry season? A. Yes B. NO

92. What is the quality of the fodder during the wet season? A. Good B. Poor

SECTION F: LAND USE SHORTAGE

93. Do you experience land shortage for use A. Yes B. No

94. If yes, what do you attribute for the shortage? (Prioritize)

1. Increased human population and land

2. Immigration of the pastoralists

3. Immigration of the farmers

4. Land degradation by overstocking, land degradation by overstocking

5. Increased livestock population

93. In which use do you experience land shortage most?
A. Cropping B. Grazing C. Both

94. When do you experience land shortage the most?
A. During the dry season B. Rainy seasons C. All the time

SECTION I: COMMUNITY VIEWS

95. How often do you see your local member of the parliament? A. Quite often B. Often
C. Never seen

96. Are your views sought about issues affecting your community? A. Yes B. No
C. Not often

If yes, specify:

97. Would you wish the government to seek your views on policy matters concerning your community? A. Yes B. No

98. Do you have access to your local councilor's office? A. Yes B. No

99. In the latest draft constitutional review, were your views sought? A. Yes
B. No

SECTION J: RESOURCE SCARCITY –LIVELIHOOD-CONFLICT INFORMATION

11. How do land and water affect your life?

1. Causes of water shortage
2. Causes of low income
3. Causes of conflicts with the resource users
4. Causes of losses of livestock
5. Causes of losses of crops
6. Others (specify)

100. Do you come into conflicts as a result of land and water shortage? A. Yes B.

No

12. If yes, what do you come into conflicts?

1. Farmers
2. Other
3. Government officials/authorities
4. Agro pastoralists
5. Wildlife
6. Other(specify)

13. What kind of conflict?

1. Verbal (shouting)
2. Armed physical fighting
3. Court cases

4. Cases in elder councils

5. Raiding and destruction of rivals properties

101. How often is the conflict between you and the resource users? A. Everyday B.
Dry season C. Rainy season

102. Do you feel secure in your homestead? A. Yes B. No

104. When did you experience the last conflict?.....

105. What was the resolution to the conflict? Explain

103. Have there been any intervention to solve the conflicts? A. Yes B. No

104. If yes, by whom? A. Government B. Elders C.

All of the above

105. In your opinions, how effective is the interventions? A. Very effective B.

Averagely

SECTION K. LIVESTOCK SERVICE DEMAND BY THE FARMER

106. What are the common livestock problems you have encountered latest in the last one year?

A. Diseases B. Theft C. Drought D. Lack of market for meat and meat products

107. In case the answer in the (1) above is A (diseases), which ones were they? A. CBPP

B. CCPP C. FMD D. ECF E. LSD F. Ticks G. Helminthes

H. Others

108. In case of sick animal, how does the information reach the information service animal deliverer? A. Farmer reporting B. Elder reporting C. Horn blowing D. Visiting AHSD E. Barazas F. Reporting committees

109. What action is taken whenever the animal is sick?

A. Slaughter for sale B. Slaughter for home consumption C. Disposal D. Call an AHSD E. Treat them F. No action is taken

110. Where do you get information about animal diseases and how to treat them?

A. Veterinarian B. Animal health assistance C. Agro vet owner D. Other (specify)
E. CBAHWs F. Owns experience

111. How long does it take you to the nearest animal health service deliverer?

(A participatory map will be done for this information) A. 0-5 Km B. 6-10 Km C. 11-15 Km D. Over 15 Km

112. Who mainly treats animals away from the home? A. Veterinarian B. Traditional

healer C. AHA D. CBAHW E. Self modern F. Self tradition

113. Who mainly treats the ones left at home? A. Veterinarian B. Traditional healer C. AHA D. CBAHW E. Self

114. Give reasons for your preferences for the answer above

- A. They are cheap B. They are rapidly available C. They are more qualified
D. They are more reliable E. No reason

115. How long does the AHSD take to respond? A. Hours B. Days C. A week

D. Over a week

116. Does he make charges? A. Yes B. No

117. Have you vaccinated your livestock this year? A. Yes B. No

How much do you pay for vaccines against the following diseases?

1. FMD

2. CCPP

3. CBP

4. Heart water

5. Black quarter

6. Other(specify)

118. Are you able to meet the cost? A. Yes B. No

119. Have your animals been sick of late? A. Yes B. No

120. If so were they treated? A. Yes B. No

121. Of the ones treated how many recovered? A. All B. None C. Some

122. Of the ones treated, how many died? A. All B. None C. Some

123. Of the ones you treated, how many needed repeated treatment? A. All B. None C.

Some

124. Of the ones you treated how many never recovered? A. All B. None C. Some

125. How many recovered on their own without treatment? A. All B. None C. Some

126. Of all those did not recover, what do you think the reasons for their non recovery?

A. Delayed reporting B. Delayed AHSD response C. Wrong medication D. Wrong diagnosis
by the AHSD E. Unavailability of drugs

127. What happened to those that did not recover? A. Slaughtered for sale B. Slaughtered
for home consumption C. Disposed off F. Sold in the livestock's markets

128. How satisfied were you with the said market? A. Very satisfied B. Satisfied
C. Not satisfied

129. Did the disease also affect the other herds within your village and without? A. Yes
B. No

130 Where do you think the disease came from? A. From the neighboring countries B. From within the herd C. From the introduced feeds D. From neighboring districts E. From newly introduced feeds

131 Are you aware of the existence of Veterinary Doctors and Para Veterinarians in the Veterinary profession?

A. Yes B. No

132 Can you differentiate between a veterinarian and a Para Veterinarian?

A. Yes B. No

133 What drugs do you buy most frequently?

A. Acaricides B. Dewormers C. Antibiotics D. East Coast fever drugs

134 What do you consider as the greatest problem affecting your access to veterinary

services? A. Poverty B. Infrastructure C. Lack of qualified personnel D. Lack of service deliverers

135 How often do you buy veterinary drugs? A. Every week B. Every month C. Four times a year D. Twice a year E. Once a year F. Never

136 Why do you prefer your choice of drugs source?

A. Price is good B. Quality advice C. Credit D. Recommendation E. Range of products D. Nearest to the source E. No other choice

137. Do you ask advice from the shopkeeper? A. Yes B. No

138. Have your cattle been introduced to the herd recently? A. Yes B. No

139. What are the reasons for the introduction? A. Purchasing B. Gifts C. Dowry D. Loans E. Other (A progeny testing to be done, one should know how the different cattle in the same homestead are related).

140. Have any of the cattle left the herd in the last twelve months? A. Yes B. No

141. What are the reasons? A. Sold B. Gifts C. Dowry D. Loaned

142. In case the cattle were taken how was the reaction from the kinsmen? A. Peaceful negotiations B. Revenge C. Reported the incidence to local authority D. No action was taken

143. In case of the answer to Q. 26 above was A, what action was agreed on? A. Compensation B. Promise that the action will not be repeated again C. No resolution D. No action was taken

144. If the answer to Q. 27 above was A, were the decisions made abiding? A. Yes B. No

PART III

FOCUS GROUP DISCUSSIONS

Date Focus group No.....

District Division.....

Enumerator.....

SECTION A: GENDER PARTICIPATION AND DECISION MAKING

- 1 Who looks after your livestock?
- 2 Who builds the kraal?
- 3 Who guards the Boma (Kraal at night) in your community?
- 4 Who guards the kraal at night?
- 5 Who builds the hut?

Who attends to:

6. Calves?
7. Lactating cows?
8. Other cattle including the sick?
9. Lactating and young camels?
10. Other camels?
11. Small stock?
12. Donkeys?
13. Poultry?
14. Who makes the decision on consumption of
 - (a) Meat
 - (b) Milk
 - (c) Poultry
 - (d) Eggs

15. Who makes the decision on the sale of

- (a) Live animals
- (b) Milk
- (c) Poultry
- (d) Eggs
- (e) Manure
- (f) Traction power

16. Who controls the use of funds from the sale of :

- (a) Live animals
- (b) Milk
- (c) Eggs
- (d) Manure
- (e) Traction power

17. Who decides whether the animals should be presented for the vaccination?

18. Who decides whether the animals should be treated?

19. Who treats them?

20. Who follows up the recovery of animals?

21. Who takes the animals for treatment and vaccinations?

22. Who makes the decisions on purchase of the medicine?

23. What would you recommend about the availability?

24. Who decides on grazing patterns and animal movement?

A1. List the most common human diseases in this area in order of their priority

(Pair wise ranking to be done)

(a)

(b)

(c)

(d)

(f)

(g)

(h)

A2. Establish the following:

1. Constraints to livestock keeping and how they are handled
2. Describe the disease affecting your livestock. What are the signs?
3. Livestock disease ranking to be done using pair wise ranking. Which disease is/are most important and why?
4. A seasonal calendar to be done using matrix scoring. In it to be included the various diseases occurring in the various season, rainfall distribution (to be counter checked with the metrological department), disease distribution, and where applicable, distribution of wild life.

- 5 Do daily activity clock for men and women in this location?
- 6 List down the animal health service deliverers in your area. (A participatory map/Venn diagram to be drawn. Relative distances to be indicated. Indicate which ones you regard to be most important-to the most important, a bigger circle to be drawn).
- 7 Who is the most available AHSD to them? (Circles to be shifted nearer the Venn diagram).
- 8 What kind of services does each AHSD offer and when?
- 9 How important are the following benefits and how do they contribute to meeting the needs of the house hold?

Benefit	MEN		Consumed at home	WOMEN	
	Rank	USE Sold		Rank	USE Sold Consumed
Live cattle					
Live camels					
Live small					
Stock					
Meat					
Milk					
Poultry					
Eggs					
Manure					
Pigs					
Donkey					

Traction

Power

Hides/skins

Others

10. Cattle production parameters

- a. On average, how long does a cow take to calve again?
- b. What is the average milk production per cow per day? Dry season.....
Wet season.....
- c. On average, how many days in the year is the cow lactating?
- d. On average how much is sold per day? Wet season.....Dry season.....?
- e. How much do you sell the milk per bottle? Wet season.....Dry season.....?
- f. How much milk is consumed at home per day? Wet season.....Dry season.....?
- g. How many times did you remove manure from your cattle shed/pen/kraal in the last one year? Wet season.....Dry season.....?
- h. On average how many pieces of hides are sold in one year?
- i. How much does one piece of hide cost?

A3. **Gender role in conflicts**

- 1. What seasons and events of the year do you feel most insecure?
- 2. Do you intermarry or trade with your neighbors?
- 3. How many members of your manyatta have died in the last one year due to the following:

C. Conflicts

D. Diseases

E. Starvation

(Pair wise ranking to be done to establish the biggest cause of the death)

4. Do you migrate?
5. If yes, Why?
6. How do you migrate, in pairs or individually?
7. If in pairs, give reasons.
8. Do you think the conflicts are to stop in the future? Give reasons for your answer.
9. Who decides on the grazing patterns?
10. Who protects the community from attacks from neighbors?
11. Who does the actual raiding?
12. Who plans and implements revenge on attacks from the neighbors?
13. Who sings praise to the young men?
14. What is the role of village foreseer in the cattle raids?
15. How is the loot shared after the raiding?
16. What happens to women whose husbands have gone raiding before they (husbands) come back? Explain
17. Do husbands/sons consult their wives before they go for raids?
18. If the wife/mother refuses to grant permission, will the person in question proceed?

19. Supposing one proceeds for raids without his mother/wife blessings, what is presumed to happen to him?

20. Explain how the loot is shared among the raiders after a successful attack.

21. What is the attitude of women whose husbands do not own livestock?

22. What the attitude of the community towards a man who does not have enough livestock to pay dowry?

A4. Market information

1. Of the crops you grow do you sell some?
2. If no, why?
3. Who buys your livestock?
4. How far is the nearest livestock market from your village?

A5. Land ownership

2. How secured do you feel regarding the ownership of the land? (It belongs to us forever, feel that they can use it for limited time, or feel that they can use it for a long period of time?)

SECTION B: WATER USAGE AND SHORTAGE INFORMATION

B1. What are the sources of water that you use for domestic use during the dry season?

1. Well []

- 2. River or stream []
- 3. Swamps or lakes []
- 4. Pipes []
- 5. Reservoir []
- 6. Spring water []
- 7. Borehole []
- 8. Ponds []
- 9. Others (specify) []

B2. What is the ownership of the water sources?

- 1. Communal []
- 2. Household []
- 3. Government/NGO []
- 4. Others (specify) []

B3. Do you pay rent for any water use? A. Yes B. No

B4. If yes, how much do you pay monthly?

B5. What are the sources of water that you use during the rainy season?

- 1. Well []
- 2. River or streams []
- 3. Swamps or lakes []
- 4. Pipes []
- 5. Reservoir []

- 6. Spring water []
- 7. Borehole []
- 8. Ponds []
- 9. Other(specify) []

B6. For watering your livestock, which source of water do you use?

- 1. Well []
- 2. River or stream []
- 3. Swamps or lakes []
- 4. Pipes []
- 5. Reservoir []
- 6. Spring water []
- 7. Borehole []
- 8. Ponds []
- 9. Others(specify) []

B7. What is being done in your community to protect or manage the sources of water that you are using?

- 1. Sources conservations by planting trees
- 2. Soil and water conservation in the water shed areas
- 3. Removing silts from the reservoirs
- 4. Preventing the animals from destroying the sources
- 5. Preventing the farmers from over exploiting the sources
- 6. Others(specify)
- 7. Nothing is being done

B8. Explain how you have coped with the draught for the past five years as a community

B9. Do you experience water shortage for your use? A. Yes B. No

B10. If yes, what do you attribute to be the cause of the shortage?

1. Increased human population and land fragmentation []
2. In migration of the pastoralists []
3. Environmental degradation by overstocking []
4. Increased livestock population []
5. Shortening of rainy season []
6. Decline in the quantity of total rainfall []
7. Others(specify) []

B11. For which use do you experience water shortage most?

1. Crop production []
2. Livestock production []
3. Domestic uses []
4. All []

B12. When do you experience water shortage for livestock?

1. Rainy season []
2. Dry season []
3. All the time []

Enumerator.....

SECTION A: INFORMATION ON TRAINING

1. How long was the first training? **A.** Days **B.** A week **C.** A month **D.**
More than a month

2. Who did the training? **A.** A GOK VET **B.** An NGO Vet **C.** An NGO staff
D. An AHA **E.** GOK Vet **F.** NGO Vet

3. Did you find your initial training adequate? **A.** Yes **B.** No

4. Have you attended any follow up training? **A.** Yes **B.** No

5. What else would you like to be trained on? **A.** Disease diagnosis **B.** Drug handling
C. Dosage rates **D.** Treatments **E.** Entrepreneurship

6. Have you been trained on business skills? **A.** Yes **B.** No

7. Can you read and write? **A.** Yes **B.** No

SECTION B. CONSTRAINTS OF ANIMAL HEALTH DELIVERY

8. What kind of services do you offer to pastoralists? **A.** Selling of drugs only **B.**
Treating animals only **C.** Both

9. Which services gives more returns? **A.** Sell of drugs **B.** Treatments

10. What constraints do you face while delivering animal health services?

- A. Inadequate training B. Lack of drugs C. Competition from AHSDs
D. Lack of funds to replenish stock E. Lack of drugs F. Debts G. All of the above

11. What could be done to improve the delivery of animal health services?

- A. Further training
B. Training more AHSDs
C. Advancing loans to AHSDs
D. Establishing links between various AHSDs

12. In case you cannot handle a case, what do you do? A. Leave it

- B. Refer it to another AHSD C. Consult with another AHSD
D. Recommend slaughter

SECTION C: ACQUISITION OF STOCK

13. How do you acquire the stock? A. Purchase from local agro vets B. Purchase from
vets C. Purchase from local markets D. Purchase from quacks

14. How is the stock delivered to you? A. Directly delivered from the dealers

- B. Delivered on bike C. Delivered on vehicles

15. How much stock do you get at a time? A. Adequate supplies B. Limited supplies

16. How long does the stock take you? A. Days B. Weeks C. A month

- D. More than a month

17. Can you buy a lot at the same time and the store? A. Yes B. No

18. If not, why? A. Lack of funds B. Unavailability of drugs C. Drugs will not be stolen D. There is no demand

SECTION D. BUSINESS SUSTAINABILITY

19. Do you give services on credit? A. Yes B. No

20. What is the mode of payment by the clients? A. Cash B. In kind

21. Is the area you are covering adequate? A. Yes B. No

22. Do you feel clustered? A. Yes B. No

23. Are you satisfied with your practice? A. Yes B. No

24. Is there any future for your practice? A. Yes B. No

25. Are you able to meet your basic needs in the practice? A. Yes B. No

D1. List your constraints as a Community Based Animal Health Worker (*in order of their priority*)

1.

2.

3.

4.

5.

D2. What would you wish to be done in order to improve your practice?

D3. Do you have any business skills? A. Yes B. No

SECTION E: BUSINESS DIVERSIFICATION

E1. Other than selling drugs and treating livestock, what else do you do for living? Explain

E2. CBAHW, s herd's structure

TYPE	NUMBER
<ul style="list-style-type: none">○ Cows in milk○ Dry cows○ Heifers○ Calves○ Bulls	
SHEEPS	
BULLS	
CAMELS	
DONKEY	
CHICKEN	
OTHER	

SECTION F. SUPERVISION

F1. Who supervises your work?

F2. Have submitted any reports to your supervisor this year? A. Yes B. No

If no, give reasons

F3. How often do you meet your supervisor?

F4. Do you do any joint work with the District Veterinary Officer?

F5. If yes, what kind of activities?

F6. Other than animal delivery programs, are you involved in community programs?

F7. If yes, list them.

PART IV: CHECKLIST FOR THE DISTRICT VERERINARY OFFICER

Date.....NO.....

District.....

Enumerator.....

(A)LIVESTOCK NUMBERS

1. Types of farming systems in the district

2. Total livestock population in the district (Daily Cattle, Beef Cattle, Dual purpose, Sheep, Goats, Donkeys, and Camels)

(B) DETAILS ON THE ANIMAL HEALTH SERVICE DELIVERY

1. Parties providing animal health in the district

2. To establish if there are any joint activities with the AHSDs.

3. To establish the community's attitude towards the other AHSDs assisting the DVO

4. To establish the number of CAWS trained in the last twelve months (where applicable)

5. To establish number still in the business (where applicable)

6. To establish how many have left (where applicable)

7. Establish reasons for CAHWs leaving (where applicable)

8. Do you think your CBAHPs can be used to handle conflicts? (Where applicable) if so, how?

9. What is the role of women if the AHSD? (Where applicable)

10. What is the role of men in the AHSD (where applicable)

PART V: CHEKLIST FOR THE NGOs RUNNING FOR CBAHPs

Name of the NGO.....

Date.....No.....

Division.....

Enumerator.....

1. To establish the activities in the area
2. To establish if there is any linkages between them and the other AHSDs
3. Establish how they would wish to improve their AHSD in their respective areas

**PART IV: A QUESTIONNAIRE FOR THE VETERINIANS AND AHAs
(BOTH PRIVATE AND GOK).**

Cadre:

Questionnaire no.....Code number.....

Name of the respondent.....indicate whether self employed GOK/vet/AHA

District.....

Division.....

Date.....

SECTION A: CHECKLIST ON THE CATTLE DISEASE IN THE AREA

1. Establish 10 most common diseases/conditions in the area?

Disease/Condition

- a.
- b.
- c.
- d.
- e.
- f.
- g.
- h.
- i.
- j.
- k.

2. To establish if Vets /AHAS have the capacity to respond to the disease outbreaks and what constrains encounter
3. To establish what they would wish to be done to improve their responses to diseases outbreaks

SECTION B: INFORMATION AND OTHER ANIMAL HEALTH SERVICE

DELIVERS

1. To establish who else works with the Vets/AHAs towards disease control?

2. Do the same parties (if there) also report disease from slaughter houses?
3. Do the Vets/AHAs get any reports of disease from the slaughter houses?
4. Where do Vets/ AHAs get any information on disease outbreak from?

SECTION C: POSSIBLE CONSTRAINTS TO ANIMAL HEALTH TO SERVICE DELIVERY:

1. How would you rate the farmers you serve in the terms of their income?
A. Low income earners B. Average income earners C. High income earners
2. What do you consider as the greatest problem affecting your practice
A. Infrastructure B. Poor policies C. Poverty among farmers D. Debts
F. Others (specify)
3. What constraints do the Vets/AHAs face while delivering animal health services?
4. What could be done to improve the delivery of animal health services?
5. What could be done to handle a case, what do they do?
6. How do the Vets/AHAs acquire stock?

7. How is the stock delivered to them?

8. How much stock does each gets per time?

9. How long does it take each Vet/AHA to restock?

10. Can they but a lot at the same time and store? If not, why?

11. Do they give services on credit?

12. What is usually the mode of payment?