PARTICIPATORY MARKET RESEARCH IN BUSINESS PLANNING FOR PRIVATE PASTORAL VETERINARY PRACTICE IN TURKANA DISTRICT, KENYA

By

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DECLARATION

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

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LIST OF ACRONYMS

DAAD	German Academic Exchange Service
PRA	Participatory Rural Appraisal
CAPE	Community-Based Animal Health and Participatory Epidemiology
AU/IBAR	African Union/Inter-African Bureau for Animal Resources
GOK	Government of Kenya
NGO	Non-Governmental Organisation
CCPP	Contagious Caprine Pleuro-Pneumonia
CBPP	Contagious Bovine Pleuro-Pneumonia
DVO	District Veterinary Office (Officer)
VO	Veterinary Officer
AHA	Animal Health Assistant
KVA	Kenya Veterinary Association
KVAPS	Kenya Veterinary Association Privatisation Scheme
ABS	American Breeder Society
FARM	Food and Agriculture Research Management
FAO	Food and Agriculture Organisation
CBAHW	Community –based Animal Health Worker
PARC	Pan African Rinderpest Campaign
UNICEF	United Nations Children Fund
SAP	Structural Adjustment Programme
AHS	Animal Health Service
HPA	High Potential Area
ASAL	Arid and Semi-Arid Land
AI	Artificial Insemination
CBS	Central Bureau of Statistics
SPSS	Statistical Package for Social Sciences
IIED	International Institute for Environment and Development
AGREF	Agricultural Research Foundation

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In memory of my beloved father,

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ABSTRACT

Little information is available on methodology to privatise the delivery of animal health services in pastoral areas. This thesis describes the use of participatory rural appraisal (PRA) tools in market research necessary for business planning of a private pastoral veterinary practice in Kokuro area of Lapur Division, Turkana District, Kenya. The aim of the study was to generate information that can be used in development of a business plan for a private veterinary practice in Kokuro area of Lapur Division, north-eastern Turkana.

The research was conducted in four livestock camps (*Adakar*) in Lapur Division, namely, Eipa, Ikong, Naarakibuk and Ngisaricho. The livestock camps were conveniently selected based on ease of accessibility. Informants were then drawn from these livestock camps to participate in PRA exercises that included workshops, participatory mapping, matrix scoring, semi-structured interviews and proportional piling. Informants were selected from the rural folks who were knowledgeable in livestock diseases and existing animal health delivery systems in the area.

The target area for private veterinary business was defined bearing in mind the livestock movement patterns. The existing animal health delivery systems were the Department of Veterinary Services of the Government of Kenya (GOK), a Non-Governmental Organisation (ITDG-EA), hawkers and herders. The animal health services offered were sale of drugs, vaccination and training of livestock owners on

basic veterinary skills. The department of veterinary services was the most preferred service provider followed by the NGOs, hawkers and herders in order of decreasing preference. The community perceived 'fair' prices for veterinary services as a range from 62.8% to 69.2% of the total value of the animal.

Anthrax, blackquater, trypanosomosis, and impacted colon (in donkeys), trypanosomosis, mange, haemorrhagic septicaemia, tick infestation and diarrhea (in camels), tick infestation, anthrax, CCPP, pox and ear infection (in sheep and goats), anthrax, CBPP, rabies, rinderpest, and ear infection (in cattle), were listed as the priority livestock diseases in the area.

Blackquarter, anthrax and trypanosomosis were reported to affect donkeys mostly during the rainy season. Impacted colon was observed more frequently in the dry season. Contagious caprine pleuro-pneumonia (CCPP) and anthrax were reported to affect sheep and goats mostly during the rainy season and during the interphase between the rainy and dry seasons. Pox and tick infestation in sheep and goats were more frequently observed in the dry season than others. Ear infections were reported to occur throughout the year. In camels, trypanosomosis was reported to occur mostly during the rainy and the dry seasons. Tick infestation and mange were reported to occur throughout the year. Diarrhoea and haemorrhagic septicaemia were reported to affect camels more in the rainy season. All priority cattle diseases were reported to occur more commonly during the rainy and the dry seasons, with the exception of rinderpest that affected cattle throughout the year. Disease prevalence ranged from 4.2% to 14.1% for ear infection in cattle and CCPP in sheep and goats respectively.

Annual gross income for a private veterinary practice was calculated from disease prevalence and livestock population estimates. The total annual gross income projected from expected clinical services, drug sales and vaccinations was Ksh.107, 443.89 for the four *Adakars*.

1.0 INTRODUCTION

The Turkana community, who practice pastoralism as the predominant form of food production, inhabit Turkana District in northwestern Kenya. Livestock are crucial and often the only principal activity supporting livelihoods in this harsh environment that is unsuitable for any other form of agriculture in the absence of irrigation. Similar to other pastoralists, livestock is the centrepiece of daily and ceremonial life and is the principal currency for social and commercial transaction (McDermott *et al.*, 1999). Growing crops is relatively less practised and in a small part of the district, the soils may have a potential for irrigated agriculture (Herlocker *et al.*, 1994).

Diseases and drought largely remain the major constraints limiting livestock production in Turkana (DVO Turkana, Annual Report, 2000). The main objective of the Department of Veterinary Services has been to improve animal health, thereby increasing livestock productivity (Turkana District Development Plan, 2002-2008). However, the delivery of animal health services in this area is poorly developed. Veterinary services are provided by the government of Kenya through the Veterinary Department, comprising of four (4) Veterinary Officers (VOs) and eight (8) Animal Health Assistants (AHAs) covering the entire area with a population of about 200,000 cattle, 2.5 million small ruminants and 115,000 camels (Hubl *et al.*, 1998). The efforts of the Government of Kenya (GOK) in animal health service provision have been supplemented by several Non-governmental organisations (NGOs) and development agencies using community-based animal health workers (CBAHWs) and trained herders in delivery of veterinary services (DVO Turkana, Annual Report, 2000).

Other problems hindering effective animal health service delivery in the district have been identified as poor infrastructure, vastness of the area, harsh climate and nomadic human populations (Hubl *et al.*, 1998).

Privatisation of veterinary services has been widely advocated as a means of improving the provision of veterinary services (de Haan and Bekure, 1991) but Turkana District has been reported among the districts that have not so far attracted any private practitioner(s) (Hubl *et al.*, 1998). Despite the huge potential for veterinary practice in pastoral areas, long distances, poor infrastructure, low economic value for individual animals, lack of a cash economy and adherence to a nomadic and transhumant livestock production system imply that veterinary practice cannot operate as a business in these areas (Dolan, 1996). Tambi *et al.* (1997) suggested that there is potential for pastoral areas to support private veterinary practices and further recommended the understanding of livestock production and changes over time and geographically, as prerequisite for this. Unfortunately, little information is available on methodology to privatise the delivery of animal health services in pastoral areas, although several approaches have been suggested and are in use (Dolan, 1996; Mariner, 1994; Mariner *et al.*, 1994). Initiatives to test private delivery systems in pastoral areas (including Turkana) have been started by OAU/IBAR (Leyland and Akabwai, 1998) but little information is available and, according to Catley (1999), "the approach remains largely unproven".

The aim of the current study is to generate information that can be used in the development of business plans for private veterinary practices in Kokuro area of

Lapur Division, north-eastern Turkana. The business plan will be important in evaluating the viability of private veterinary practices in this unique area taking into consideration the above-mentioned constraints.

1.1 OBJECTIVES OF THE STUDY

The specific objectives of the study were:

1. To define a target area for private veterinary business in Kokuro area of north-eastern Turkana and determine livestock movements in the area.
2. To identify the existing animal health delivery systems, the services they offer and those that are potential candidates for privatisation.
3. To determine local preferences for different types of veterinary service providers.
4. To determine local community's perceptions of 'fair' prices, constraints and opportunities for veterinary services.
5. To identify priority livestock diseases, their seasonal variation and annual prevalence.

2.0 REVIEW OF LITERATURE

2.1 EVOLUTION OF ANIMAL HEALTH SERVICE DELIVERY IN THE TROPICS

The evolution of institutions that deliver animal health services in the tropics appear to have passed through four recognisable phases. These follow the pattern of veterinary epidemiological revolutions proposed by Schwabe (1993).

The pre-institutional era, which was the earliest, was characterised by the absence of organised veterinary institutions while the indigenous animal health service that was available was provided and procured by private arrangement between clients and service providers. Following the arrival of colonial administrators in Kenya at the turn of the 20th century, conventional veterinary medicine was introduced. The Veterinary Department provided clinical and diagnostic services, research and training, policy formulations and advisory services, often, free of charge. At independence, the Government of Kenya subsequently inherited without change the veterinary institutions and policies of the colonial administrators (Odeyemi, 1995).

From the time of independence in 1963 until the early 1990s, Kenya had a successful government-based animal health care system. The public veterinary service was established to control exotic or epidemic diseases but in addition, other health care services were delivered, for example, the control of endemic diseases (Dawson,

2000). Unfortunately in the late 1980s, the government was unable to continue funding these services. The latter was compounded by ambitious staff development and expansion programmes which resulted in overstaffing. Accompanying this turn of events were the global economic recession and administrative inefficiencies which incapacitated the government's efforts to adequately fund the delivery of animal health services thereby resulting in the deterioration and subsequent restructuring and privatisation of some services (Odeyemi, 1995).

A move towards privatisation in the early 1990s resulted partly from a global re-evaluation by international donors of the role of the state in the provision of veterinary and other services and partly from budgetary pressures. The budgetary pressures resulted from high staff levels that saw a rapid increase in personnel costs at the expense of non-salary recurrent funding. The salary/non-salary ratio, one of the indicators of the efficiency of livestock service, dropped from an excellent 40/60 in 1974 to a poor 70/30 in 1981 (de Haan and Bekure, 1991). This trend has probably continued to the present day with the unavoidable decline in the funding of veterinary service delivery by the state (Dawson, 2000).

The Kenya Veterinary Association (KVA), through funding from the European Union, has implemented a privatisation scheme (The Kenya Veterinary Association Privatisation Scheme-KVAPS) through the provision of credit facilities to veterinary doctors. This is carried out in collaboration with pharmaceutical firms and Non-Governmental Organisations (NGOs) like the American Breeder Society (ABS) and the Food and Agriculture Research Management (FARM) Africa project. By 1991,

KVAPS had supported 42 veterinarians to start private practices in high potential dairy farming areas only (Okwiri, 1999). Since then, there has been a gradual increase in the number of private veterinary practices in Kenya, with 230 being recorded by the year 2000 (Kariuki, 2000). Non-Governmental Organisations like ABS, Technoserve and Heifer Project International have also trained more than 23,000 farmers in business skills, over 600 agricultural entrepreneurs and over 40 self-help groups (Dawson, 2000). Programs like Intermediate Technology Development Group (ITDG-EA) (Grandin *et al.*, 1991), FARM Africa and other organisations have undertaken the training of individual farmers to manage simple clinical cases at farm level.

Privatisation is taking place while micro-loans have become a popular vehicle for small business start-ups. Spontaneous private veterinary practices also evolved following the stoppage by the government of automatic employment of newly graduating veterinarians since 1988 (Wamukoya *et al.*, 1995). Currently, there are many service providers on foot, bicycles and motorcycles distributing drugs and other products like feeds and semen. Village drug stores have come up as well as auxiliary staff with some experience in animal health care. Ethno-veterinary research and development has also identified the local knowledge and its associated skills, practices, beliefs and social structures pertaining to health care (McCorkle *et al.*, 1996).

2.2 OBJECTIVES AND FUNCTIONS OF ANIMAL HEALTH SERVICES

The Food and Agriculture Organisation (1991) identified three major functions of animal health services. These are:

(i) Development of animal health and production through disease investigation and surveillance, disease prevention, control and eradication, quarantine, emergency response, clinical services, control of animal drugs and biological products, veterinary inspection, research, training, wildlife disease monitoring and veterinary aspects of aquaculture.

(ii) Protection of human health by control of zoonoses, food hygiene, meat inspection, residue testing and training.

(iii) Protection of animals and welfare by ensuring humane treatment of animals in general, enforcing welfare standards in markets, during transport and slaughter and control of laboratory animals.

In Turkana District of Kenya, the delivery of animal health services is poorly developed as explained in the introduction. This therefore implies that the above objectives identified by FAO remain largely unachieved in this vast district. It is therefore imperative that considerable efforts be directed towards improvement of animal health service delivery in the district and other deserving areas of the country. This thesis tries partly to address this pertinent issue through generation of information that will be vital in establishment of private veterinary practices in the district.

2.3 CLASSIFICATION OF ANIMAL HEALTH SERVICES

The economic characteristics of animal health services allow for their classification into private goods, public goods or services that confer externalities. Externalities are costs or benefits that are not borne by the purchaser of a good (Otieno, 1999). Others have used the concepts of excludability and rivalry to identify those services that can be financed by the private sector and those that require public funding (Holden, 1999; Otieno, 1999). Excludability considers whether the provider or consumer of a service can prevent (or exclude) others from simultaneously benefiting from the service. Rivalry (or subtractability) concerns the extent to which the use of or consumption of a good or service by one individual reduces the availability of the good or service to other people (Holden, 1999).

The economic characteristics of a service are not static. The rivalry and excludability attributes can change over time with the development of new disease management technology, or with changes to the regulatory and information environment within which services are delivered (Holden, 1999). The principle criterion used to define public versus private sector financing in disease control is the degree of externality associated with the disease and where that externality occurs. Where high externalities are associated with disease control, it becomes a public good, as the costs of control to the individual outweigh the benefits that can be captured by the individual. There are therefore no incentives for the individual to control the disease (Holden, 1999) but there are considerable benefits to society as a whole.

Collective and public goods can be provided by the private sector if the private sector can deliver them more efficiently. One complication in the delivery of public goods is that beneficiaries do not necessarily pay the true costs and may over apply (i.e use more than is economically optimal) an input from a marginal revenue perspective. When services are provided at their market-derived costs, the beneficiaries would only pay for a service where benefits are perceived to exceed the cost of service resulting in optimum allocation of resources (Otieno, 1999). The pricing of public goods is more complicated, as important externalities may also occur.

Input delivery of private goods through the private sector is argued to be more efficient and sustainable (Otieno, 1999). The services with strong private good characteristics include clinical services, drug sales and vaccinations against endemic diseases. These services have high excludability (non-fee payers can be denied access to most of the benefits of the service), hence their delivery via the private sector would result in an economically optimal provision (Leonard *et al.*, 1999). Under these circumstances, the public sector would remain purely regulatory (Otieno, 1999).

Leonard (1987) classifies veterinary services into preventive, curative and promotive. Preventive services exclude the occurrence of disease through administration of drugs, sera, vaccines and control of transmitting vectors. Curative services involve treatment of diseased animals while promotive services inhibit the occurrence of diseases and improve productivity.

The majority of veterinary departments in Africa were, and still remain, focussed on preventive services. Leonard (1987) notes that this orientation is justified on the basis of high benefit/cost ratios reported from most veterinary preventive work. With regard to curative services, there is a poor level of service provision to traditional livestock producers.

2.4 CONSTRAINTS TO THE DELIVERY OF ANIMAL HEALTH SERVICES

2.4.1 High transaction costs

Veterinary medicine in Africa continues to have high transaction costs associated with distance despite the great improvements in transportation that have taken place. Transaction costs refer to all costs that occur between the provider and the consumer of animal health services (Leonard, 2000). These include obvious costs associated with transportation and less evident costs such as losses associated with misdiagnosis and poor treatment when farmers lack information. Transportation is particularly important in pastoral systems of livestock production because of the movement of people and animals to exploit available food and water (McDermott *et al.*, 1999). Local monopoly remains a distinguishing characteristic of most areas. However, for animal health products that are easily transported, regional price differentials usually disappear (Leonard *et al.*, 1999).

The professional level of animal health providers is another component on the cost of service delivery. The more highly trained the provider, the higher the fee he/she will

demand and the greater the cost of transport is going to be, for increased professionalization tends to carry with it reduced numbers, urban residence and greater comfort in travel (Leonard *et al.*, 1999). Animal Health Assistants more often than not use cheaper means of transport like bicycles and motorcycles. It is also generally accepted that veterinary services will be ineffective if staff salaries represent more than 60 percent of the total budget leaving less than 40 percent for veterinary supplies and transport (Leonard *et al.*, 1999). From an economic point of view, the appropriate training for providers would be determined by making the following calculation for the alternative levels and choosing the result with the highest total:

> "The average value of animals served (including externalities)
>
> [multiplied by] The reduction in the probability of death resulting from service at a particular level of training [less] The average unit cost of providing that service (Leonard, 2000)."

Making services available on market days, at gazetted dipping times and along pre-set routes through which animal health providers travel at regular established intervals, are all ways of reducing time and costs involved in travel and therefore the unit cost of service. Another option would be to concurrently run community medical and primary veterinary health services together, particularly in pastoralist areas where veterinary services are often more readily available and in greater demand than medical services (McDermott *et al.*, 1999).

2.4.2 Poor administrative infrastructures

In many developing countries, veterinary departments are not given the appropriate legal power in the administrative system (FAO, 1991). The current policy and legal framework in Kenya is a major constraint to delivery of animal health services. The Veterinary Surgeons Act, Cap.366 excludes semi-professionals from registration and therefore cannot establish private practices on their own unless under the employment of registered veterinary surgeons. This restricts semi-professionals and even other cadres of veterinary personnel, in private veterinary practices. The Pharmacy and Poisons Act, Cap. 244 does not allow veterinarians to carry out business of veterinary drug stockist unless to possess veterinary drugs for purposes of legitimate veterinary treatment. More so, it does not include veterinarians in drugs inspectorate service thereby consequently leading to veterinary drugs abuse and misuse in the field because pharmacist dispense them indiscriminately without regard to the laid down ethical practices. This situation leads to drug residues in animal products, poor quality of clinical work, accelerated microbial resistance to drugs and entry of inferior and unregistered drugs in the market. Several obstacles in both High Potential and ASAL areas meet animal Health Service delivery policy. Application of cost sharing policy in ASAL areas is hindered by several factors which include; Low cash economy, lack of easily accessible markets, long distance to consumer population, cultural resistance to rational herd off take, restricted livestock movement to due to CBPP, regular droughts, unfavourable land tenure system, low literacy level, vastness of the area and pastoralism. In high potential areas, uneconomical land size and mismanagement of farmers' organisations remain the major obstacles in the application of this policy.

The policy on privatisation and sustainability in ASAL areas is confronted by a range of obstacles which include; Long distances to drug supply points, poor infrastructure, general insecurity, lack of trained veterinary personnel, reluctance of veterinarians from high potential areas to work in ASALs, lack of government veterinary staff resulting in inadequate service delivery and difficulty to access credit facilities. Considerable deficits in the areas of government control and standardisation regarding animal production and health services have often been realised. This encourages among other vices the importation of substandard products. It is therefore not possible to design effective disease control programs. Information services as well as transport, communication, veterinary products and equipment are in most instances outdated and overtaken by new development in the livestock industry. Some of these problems result from the shortage of funds needed to sustain the activities of veterinary staff (Kleeman, 1995).

2.4.3 Difficulties facing veterinarians in private practice

Turkson and Brownie (1999) have reported the constraints encountered in the process of privatisation of veterinary services in Ghana. Questionnaires were administered to veterinarians to elicit their responses on various issues concerning privatisation. A significant proportion (61%) of government veterinarians, who formed 94% of the respondents were unwilling to go into private practice. Among the reasons given were that private practice was too risky, that farmers were unwilling or unable to pay for services, that capital to start practices was lacking and that the societal value for animals was low. Also, low livestock densities in many areas and the absence of

commercial livestock farming were perceived as deterrents to the sustainability of private practice. Furthermore, the poor macroeconomic environment of high inflation, high interest rates and unstable currency discouraged investment in this sector. In a similar study carried out in Kenya, Njoroge *et al.* (2000) established that recent veterinary graduates had not ventured into private veterinary practice due to lack of capital. Several constraints to setting and running a private veterinary practice in Kenya have been identified as lack of capital, high transport expenses, defaults in payments by clients, taxation, registration and licence fees and lack of diagnostic support (Wamukoya *et al.*, 1995).

2.5 VETERINARY SERVICE DELIVERY IN REMOTE PASTORAL AREAS OF AFRICA

Veterinary services are poorly developed in remote pastoral areas of Africa. Very many reasons have been suggested to be responsible for this state. For example, long distances, poor transport and communication facilities, low economic value of individual animals, lack of cash economy and the practice of nomadic and transhumant livestock production system imply that private veterinary practices can not thrive in these areas (Dolan, 1996). In addition, Catley (1999) described large size, harsh climate, poor infrastructure and the relatively small and mobile human populations as constraints to conventional, fixed point service delivery. In most African countries, government policy on pastoral development ignores pastoral livestock production system and further suggests sedenterisation or other inappropriate means as a solution (Bonfiglioli, 1992; Haagsma and Hardeman, 1998;

Oxby, 1989; Scoones, 1994; Swift *et al.*, 1990; Toulmin and Moorehead, 1993). Veterinarians from other ethnic groups are also unwilling to work in pastoral areas (Catley, 1999).

Non-governmental organisations and development agencies have supplemented government efforts in delivery of animal health services in arid and semi-arid lands (Wamukoya *et al.*, 1995). As a result of this collaboration, new approaches have been suggested and used to deliver animal health services to pastoralists. Several initiatives have used decentralised animal health delivery system involving the local communities (Dolan, 1996; Mariner and van't Klooster, 1994). Experiences generated from the use of decentralised animal health systems have been documented as for example in Kenya (Blakeway, 1993), Afghanistan (Leyland, 1993), Sudan (Dahir, 1993), Chad (Peters, 1993) and Senegal (Obel-Lawson, 1992). Although there is paucity of information on impact of community-based projects in veterinary service delivery, some successes have been published (Catley, 1999). Blakeway (1995) calculated reductions in calf mortality and other production benefits from use of CBAHWs. Similarly, Holden (1997), in a case study of a CBAHW project in northern Kenya, established that CBAHWs reduced cattle mortality rates by 42% and small ruminants losses by 68%. In Kenya, a review of Oxfam UK/Irelands projects in northern Kenya found out that there was reduced loss of livestock valued at Kshs. 22,853 for each household in the project area (Odhiambo *et al*, 1998). The use of CBAHWs has been employed in approaches aimed at rinderpest eradication in Africa. For example, immunity levels of cattle were boosted from 60% to 83% in the Afar region of Ethiopia by PARC-Ethiopia through the use of CBAHWs to vaccinate cattle

against rinderpest (Mariner, 1996). In another area of southern Sudan, UNICEF-Operation Lifeline Sudan (southern sector), Livestock programme achieved a 10.6 fold increase in vaccination coverage through the use of community-based systems (Catley, 1999).

2.6 ECONOMICS OF VETERINARY SERVICE DELIVERY

2.6.1 The role of public and private sectors in financing veterinary services.

Economic concepts of excludability and rivalry have been used to identify appropriate roles of public and private sectors in financing services. Umali *et al.* (1992) applied these concepts to identify appropriate sources of funding for delivery of veterinary services. Clinical services, drug sales and vaccinations against endemic diseases have strong private good characteristics and can therefore be paid for by the livestock owners (Holden, 1999). However, extension and research services may be either public or private good depending on extension methodology or research type (Beynon *et al.*, 1998). Research and extension services can therefore be financed by the private sector or the state (Holden, 1999). It is worth noting that the economic characteristics of a service are not static and can change over time with development of new technology changes to the regulatory and information environment within which services are delivered (Holden, 1999). It is therefore imperative that economic theory be used to identify those services that could be financed by the private sector allowing the scarce resources of the state veterinary services to be focused on provision of public good services.

2.6.2 The role of public and private sectors in the delivery of veterinary services.

Holden (1999) used the economic theory to suggest appropriate public and private sector roles in delivery of veterinary services. Under this theory, the private sector can supply private good services, including clinical services, drug sales and vaccination against endemic diseases. It further suggests that the state could support the efficient operation of the private sector by setting, monitoring and enforcing standards for service delivery and making the information available to the public. Private organisations also supply toll good services such as vaccine production units, diagnostic laboratories, veterinary clinics and dipping facilities. Holden (1999) further suggests that collective action organisations can also provide services for which there is no competition as these organisations act in the interest of members and so avoid the problems associated with monopolies. These organisations could also manage common pool goods such as control of tsetse flies on communal lands. The private sector may supply public good services such as control of epidemic or zoonotic diseases (including movement control, quarantine and disease surveillance), food hygiene inspection, drug quality control, research and extension. The government, through the use of licensed veterinary inspectors, can monitor and control the quality of services. The state should plan the delivery of public good services and manage private sector contracts. The use of economic theory to redefine the role of the state in provision of veterinary services creates synergies between the public and private sector and capitalises on comparative advantages of each sector (Holden, 1999).

2.7 COMMUNITY PARTICIPATION IN ANIMAL HEALTH SERVICE DELIVERY IN AFRICA

The use of primary level veterinary workers in Africa can be traced back to pre-independence where paravets and veterinary scouts were involved in the control of diseases (Jack 1961; Falconer, 1973; Henderson *et al.*, 1973; Lowe, 1973; Peck, 1973). At post independence, the African governments trained their own veterinarians and other types of workers using formal systems of education and this reduced the use of primary level field workers (Baumann, 1990). In the late 1970s onwards, a second wave of involvement of primary veterinary workers in Africa's animal health service delivery emerged and these have been described in Ethiopia (Sandford, 1981), Sudan (Schwabe, 1980), and Somalia (Baumann, 1990). These projects used local people in design and delivery of veterinary services (Catley, 1999). The late 1980s was associated with increased interest from NGOs for decentralised animal health systems in marginalized areas of Africa. The ITDG organised workshops that brought together veterinarians who were developing paravet type projects in dry land areas of Sudan, Chad, Uganda, and Ethiopia (Young, 1992). Information from paravet projects in Africa was published in Arid Lands Information Network and the Appropriate Technology Journal issue of 1993.

2.8 THE DELIVERY OF VETERINARY SERVICES IN KENYA

Most governments in sub-Saharan Africa experienced financial crises in the 1970s and 1980s. This phenomenon caught up with Kenya in 1980s when a negative trade

balance, huge external debt burden, reduced aid inflows and increasing fiscal deficit occurred. As a result, the Government of Kenya instituted structural reforms aimed at revitalising the economy. By 1985, the Department of Veterinary Services' budget had shrunk by 28% and Sessional Paper No 1 of 1986 spelt out the Kenya Government's commitment to continue to offer animal health services at subsidized levels to farmers and at the same time to encourage cost sharing for some of the services. From 1990, the Kenya Government started full implementation of a structural adjustment program (SAP), thus gradually reducing its role in the delivery of animal health services.

With the advent of SAP, the new Animal Health Service (AHS) delivery policy now focuses on partnership, involving Government on one hand and the private sector and beneficiaries on the other (Kajume, 1999). The privatisation policy was recognised as the best option to build a viable and self-sustaining system. According to the current policy, veterinary services have been subdivided into public goods, private goods and mixed services.

Public goods are services that the Government should continue to provide and include: enforcement of quarantine; licensing and certification; provision of hides and skins quality control; provision of vaccine quality and biological inputs control; control of epizootic diseases; enforcement of livestock movement control; formulation of policy guidelines, execution of policy analysis; provision of legal services to the ministry and setting of (sub-) sector-wide development priorities.

Services to be privatised (private goods) have been defined and include: provision of veterinary clinical services; provision of AI services; management of dips and livestock crushes; production and distribution of bull semen for AI; production of animal vaccines and veterinary drugs; and supply and distribution of veterinary drugs and animal health inputs. Currently, the number of veterinary practices in Kenya stands at around 227 and the services offered include, clinical services, agro-vet shops, artificial insemination services, contract vaccination and consultancy. The GoK has taken several steps to support privatisation initiatives. These include: training at certificate, diploma and degree levels to ensure availability of manpower; training of inseminators for the private sector; support of KVAPS; stoppage of automatic employment of certificate, diploma and degree holders from training institutions; contracting out vaccinations to private veterinarians.

Services to be carried out on shared basis (mixed services) have also been defined. These are: provision of meat inspection (sanitary mandate); inspection of slaughter houses (sanitary mandate); vaccination against notifiable diseases (sanitary mandate); collection of samples for disease surveillance and monitoring (sanitary mandate); disease reporting; provision of animal health extension services; provision of veterinary clinical services (transitionally); provision of AI services (transitionally); provision of dipping services (transitionally); and provision of veterinary laboratory services. In line with this policy of cost-sharing and cost-recovery, charges for services have been introduced and/or ammended to reflect the new policy direction. Additionally, attempts have been made to create a veterinary Services Development Fund that is now operational.

A task force on legal matters has been formed within the Ministry of Agriculture and Rural Development. The task is charged with the responsibility of reviewing the laws related to agriculture with a view to harmonising them with Agriculture Sector Policies. The Government has also realised that the current policy/legislation framework is more appropriate for High Potential Areas (HPAs) as compared to Arid and Semi-arid Areas (ASALs). There is therefore need for formulation of service delivery approaches/strategies for ASALs and need to remove any policy or legal impediments in consultation with ASAL stakeholders.

2.9 CONCLUSION

The above review demonstrates the changes over time regarding the provision of animal health services in Africa and it is quite evident that animal health services in the continent have been on the decline over the past two decades. On the other hand, the human population of sub-Saharan Africa is growing at 2.7% per annum while the average annual growth rate in livestock production is approximately 2.2%. It is therefore imperative that sub-Saharan African countries should increase the productivity of livestock by 4% per annum or else severe food shortage will strike the continent by the year 2025 (World Bank, 1990). The most cost-effective gains in livestock production can be made through the provision of improved animal health services. Many countries in the region support privatisation of veterinary services as a means to a tangible improvement of veterinary service delivery and this has seen the development of private veterinary practices in high potential areas, as well as urban and peri-urban areas. Despite the fact that the majority of livestock are found in

ASALs, private veterinary practices are virtually non-existent. Several reasons have been cited to explain this dilemma but the major contention question has been on the methodology of privatising the delivery of veterinary services in these areas. Therefore, great efforts should be mounted and focused on research work geared towards formulation of appropriate and economic approaches to privatisation of animal health services in these areas.

3.0 MATERIALS AND METHODS

3.1 DESCRIPTION OF THE STUDY AREA

The study was carried out in Lapur Division of Turkana District, Rift Valley Province of Kenya in March and April 2002. Turkana District occupies the northwestern part of Kenya, sharing international borders with Ethiopia to the North, Sudan to the northwest and Uganda to the West. Within Kenya, the district borders Marsabit to the east, Samburu to the southeast and Baringo and West Pokot districts to the south. The district lies between longitudes $34^0 0'$ and $36^0 40'$ East, and between latitudes $10^0 30'$ and $5^0 30'$ North. It covers an area of approximately 77,000 km^2. Turkana District has 17 divisions, 56 locations and 158 sublocations, with a human population estimated at 450, 860 people (CBS, 2001). The district, located in Arid and Semi-arid Lands (ASAL), receives an annual rainfall of about 120 mm and the temperature ranges between 24 and 38^0C.

Lapur Division covers an area of approximately 4650 km^2 and comprises of three locations and seven sub-locations. The total human population in this division is estimated at 13,760 people (Turkana District Development Plan, 2002-2008). The division supports 15,800 cattle, 73,200 sheep, 146,000 goats, 12, 400 camels and 2,900 donkeys (District Veterinary Office, Turkana, 2002). The division falls under range unit no 11 with landforms comprising of 19% mountains, 36% hills 10% uplands, 4% foot slopes and 31% piedmont plains (Range Management Handbook of

Kenya, 1994). The vegetation types are 64% deciduous bushland and 36% deciduous shrubland. The area receives a median annual rainfall of 200 to 300 mm and 50% of the range unit is within 10 km of permanent water (Range Management Handbook of Kenya, 1994). The people of Lapur Division settle in the plains during the rainy season. However, due to the dictates of dry weather, they move mostly to the high mountain areas of *Lorionotom* hill and to the neighbouring countries of Sudan, Ethiopia and Uganda where pasture and water is available for their livestock. The common diseases affecting livestock in the area are CBPP and CCPP (District Veterinary Office, Turkana, 2002). The Veterinary Department of the Government of Kenya (GK) and Intermediate Technology Development Group Eastern-Africa (ITDG-EA) play a major role in provision of animal health services in the division. The location of the study area is shown in Figure 1.

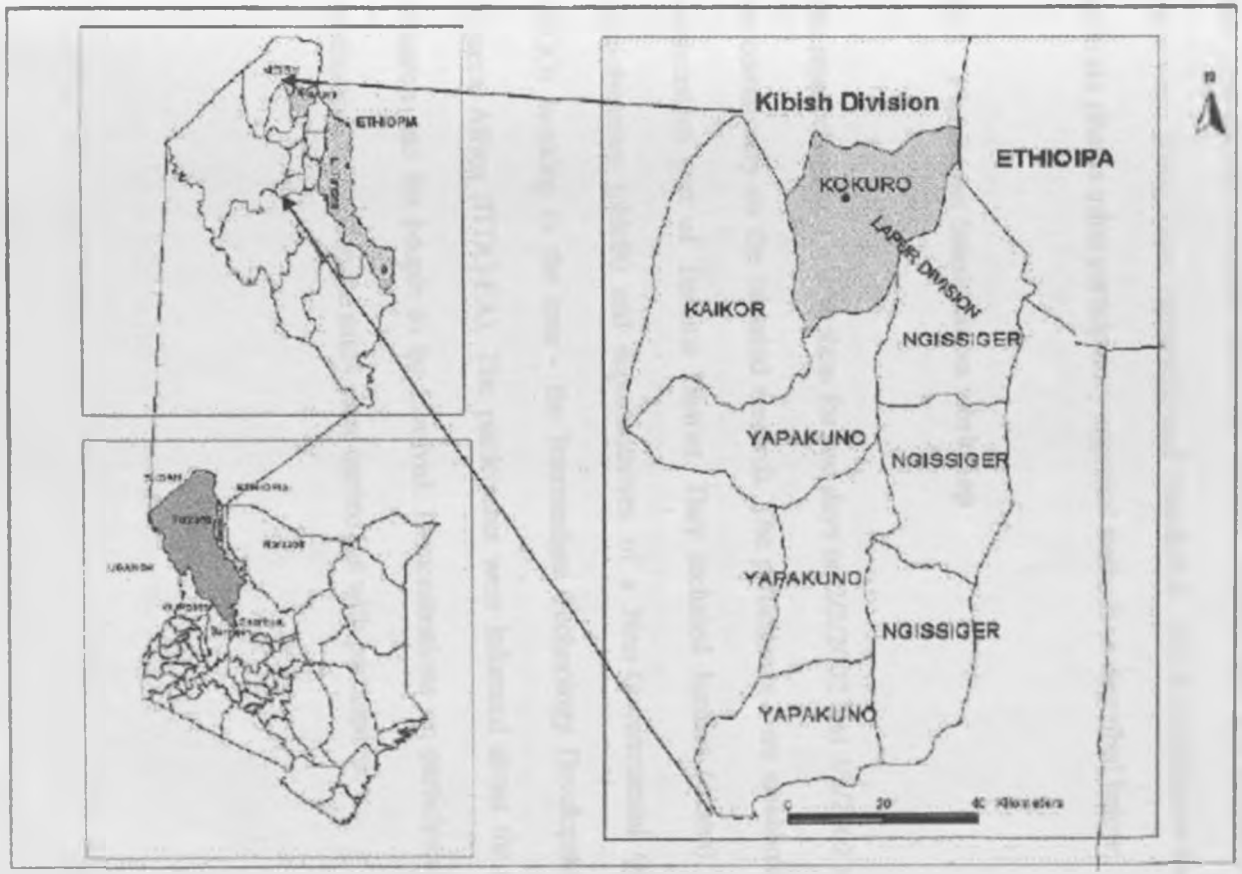

Figure 1: Map of Turkana District showing Lapur Division (the study area).

3.2 DATA COLLECTION

The research was conducted in four livestock camps (A livestock camp comprises of a group of households living in the same location and moving together for purposes of communal utilisation of pasture and water) in Lapur Division. The livestock camps were conveniently selected based on security, accessibility and logistical reasons. These were Ikong, Eipa, Ngisaricho and Naarakibuk. The data collection was carried out in six phases using participatory appraisal methods as described below:

3.2.1 Phase one: Sensitization workshop

The researchers held a workshop for two days on 2/3/2002 and 3/3/2002 to sensitise the community on the intended research. The participants were stakeholders in the northeastern part of Turkana District. They included herders (elders), provincial administrators (chiefs) and representatives of a Non-Governmental Organisation (NGO) working in the area - the Intermediate Technology Development Group-Eastern Africa (ITDG-EA). The participants were informed about the purpose of research and the people to be involved. Demonstrations on participatory research methods to be used in the study were carried out with participants.

3.2.2 Phase two: Participatory mapping

The objective of this part of the study was to define the target area for the business, livestock movements into and out of the area and current veterinary services. One group of informants in each cattle camp (*Adakar*) was involved. Each group consisted of 5-15 people. On a clean space on the ground, the group was asked to produce a map showing features such as:

- geographical boundaries of the *Adakar;*
- grazing areas for their livestock;
- veterinary service providers;
- seasonal movements of livestock.

Locally available materials such as stones, sticks and bones were used in construction of the map. After explanation of the mapping procedure, the group was left alone for about 30 minutes. Progress was checked after this time and more time was given on request by a group. Upon completion of the procedure, a group was asked to explain the key features of the map. A north- south orientation was added to the map. Two large copies of the map were made on to flip chart paper and one copy was given to each group.

3.2.3 Phase three: Semi-structured interviews

This phase was aimed at identification of veterinary services offered and those that were potential candidates for privatisation. Constraints and opportunities for

veterinary services were also explored. A checklist of important points to be covered was prepared to allow for flexibility of the interview (see Appendix 1). Traditional community meeting sites such as the '*Tree of men*' were used as interview sites. The elders were interviewed at a time when the herders (mostly young men and boys) had taken the animals for watering or grazing. This was the time when they were available and with optimal concentration. The interviews lasted for about an hour to avoid loss of interest and decline in the quality of information. The informants were asked open-ended questions and probing was used in data gathering and data quality control. I conducted all the interviews since I am conversant and speak the local language fluently (Appendix 2).

3.2.4 Phase four: Matrix scoring

The objective of this phase was to determine local preferences for different types of veterinary service providers and seasonal variations in livestock disease prevalence. In determination of local preferences for different types of veterinary service providers, three groups of informants were involved in matrix scoring per *Adakar* . Each group consisted of 5-10 people. The informants were asked to name the veterinary service providers for the *Adakar*. The service providers named were represented using every-day objects such as stones, bones, sticks, and leaves. These objects were placed along the top 'x-axis' of the matrix. Each of the service providers was scored against a list of qualities/criteria named by the participants. These criteria were; frequency of visits, variety of services offered, cost of services/drugs, effectiveness of drugs/service, advice and professional knowledge. Objects placed

along the left 'y-axis' of the matrix represented these qualities. For each quality, the informants were asked to score each service provider by dividing a pile of 20 stones against the service providers (Figure 2). After scoring of each criterion, the researcher prompted the informants to check their scoring and confirm that as a group, they agreed that the scores were correct. When all the qualities had been scored, the results were recorded and the researcher asked additional questions to cross-check and probe the responses.

Priority diseases stated by the informants were used in the construction of the seasonal calendars. Local names for seasons were used and each season was represented using an object placed along the top 'x-axis' of the diagram. Objects depicting diseases were placed along the 'y-axis' of the diagram. The scoring was done as described in the preceding matrix scoring in phase four. One seasonal calendar was constructed with one group of informants from each *Adakar*.

Figure 2: Elders performing a matrix scoring exercise under '*a tree of men*' at *Adakar* Naarakibuk of Lapur Division, Turkana District, March/April 2002.

3.2.5 Phase five: Proportional piling

The aim of this part of the study was to determine the local perceptions of 'fair' prices for veterinary services. This part was administered to individual pastoralists. Using a pile of 100 stones to depict a healthy animal, each informant was asked to divide the stones into the 'value of the animal lost as a result of a specific disease' and 'the remaining value'. Another pile of 100 stones was used to depict the total amount of money accruing from the sale of an equally healthy animal of the same species. The informant was asked to divide the stones into 'the amount he/she wished to spend in treatment of the sick animal' and 'the remainder for other uses'. This method was

repeated with 51 informants with 4 species of domestic animals and two priority diseases for each species. This activity was also used to estimate the relative prevalence of priority livestock diseases in different age groups of 4 species of domestic animals. Using a pile of 100 stones to depict the age group, the stones were divided by informants into 'sick animals during the last year' and 'healthy animals during the last year'. The informants further subdivided the pile of stones representing sick animals to show relative numbers of animals suffering from the priority diseases and 'other diseases' (Figure 3). The procedure was repeated with 45-60 informants for each species of domestic animals.

Figure 3: A participant is guided through a proportional piling exercise at *Adakar* Eipa of Lapur Division, Turkana District, March/April 2002.

3.2.6 Phase six: Stakeholders workshop

A workshop was held with livestock keepers where findings were presented and verified. The best options for improving animal health service delivery were discussed. The attendants of the workshop were livestock owners, provincial administrators (the chiefs), representatives of an NGO working in the area (ITDG-EA) and representatives of the Government of Kenya veterinary department working in the district.

3.3 DATA HANDLING AND ANALYSIS

3.3.1 Data handling and sorting

The maps for the *Adakars* that were constructed by the pastoralists were scanned using computer scanners. The data collected was first stored in field notebooks. The data obtained through matrix scoring and proportional piling was later transferred to Microsoft Excel software. In this software, the matrix scoring data on herders' preference for veterinary service providers was sorted out into separate columns representing the informant groups, *Adakars* and service provider/criterion combinations. Matrix scoring data on seasonal calendars was similarly entered into separate columns representing the informant groups, *Adakars* and season/disease combinations for each of the four species of livestock considered. For data on proportional piling for disease prevalence, entries were done on columns representing herd number and diseases affecting different age categories in all the four species of

livestock. Similarly, the data on herders' perception of 'fair' prices for veterinary services was sorted out into columns representing lost value counts and treatment cost counts for two diseases per species considered. Columns were also created for the informant numbers, sex, group category and location.

3.3.2 Analysis of semi-structured interviews data

These data were summarized using qualitative methods.

3.3.3 Analysis of Matrix scoring data

The Microsoft Excel worksheet for the above data was imported to SPSS and saved as SPSS file. Data were analysed using SPSS (version 11.0) spreadsheet. Scores were summarised using median, minimum and maximum scores and 95% confidence intervals for every service provider/criterion combination and disease/season combination. Kendall's Coefficient of Concordance (W) was used to assess agreement between informant groups. The results were presented as a single matrix indicating the median, minimum and maximum scores.

3.3.4 Analysis of proportional piling data

The Microsoft excel software was used to analyse data on livestock disease prevalence. The data were summarised using mean prevalence and 95% confidence limits for each disease by age group category. Data on herders' perception of 'fair' prices for veterinary services earlier saved as Excel worksheet, was imported to SPSS

and saved as SPSS file. Data were analysed using SPSS (version 11.0) spreadsheet. Mean lost value (%) and treatment cost (%) and 95% confidence limits for each sex and group of informants were calculated. The relationship between lost value and treatment cost was explored using a line graph.

4.0 RESULTS

4.1 Participatory mapping

Figure 4 shows the map of the location of the four *Adakars* in the study area developed during the participatory appraisal. It defines the target area for the business, livestock movements into and out of the area and current veterinary services. During the rainy season, livestock moved from northwest to southeast and the situation was reversed during the dry season. The direction of movement is dictated by availability of pasture and water. The sole drug store for veterinary medicines in the area was located at Kokuro centre. The centre also served as a livestock sale point. Availability of vaccination services for livestock was depicted by the presence of vaccination sites in the area. Other features shown were mountain ranges, rivers, watering points, police post and neighbouring communities in other countries (Toposa of Sudan, Dongiro and Merille of Ethiopia). The Turkana community of Lapur Division has a history of traditional cattle rustling against these neighbouring communities.

4.2 Animal health delivery systems and privatisation of veterinary services

The livestock keepers mentioned four sources of veterinary services in the area. These were; the Veterinary Department (GOK), NGO (ITDG-EA), hawkers and the herders. The animal health services offered were enumerated as sale of veterinary drugs, vaccinations, treatment of sick livestock, and training of herders in basic veterinary

skills. The GOK was recognised for vaccinations that were carried out annually against rinderpest and CBPP. The herders also remembered incidences where goats were also vaccinated against CCPP through a joint effort between the GOK and ITDG-EA. The NGO working in the area was well known for sale of veterinary drugs and training of herders on elementary veterinary skills. The hawkers sold veterinary drugs, especially antibiotics and trypanocides. The herders also relied on locally available herbs for treatment of livestock diseases. Some of the herbs named were *Emus, Ekaye, Ekapang'iteng* and *Egong*. The livestock keepers paid for drugs sold to them by various service providers. Although they had not started paying for treatment charges and vaccinations, the livestock owners were willing to pay for these services.

4.3 Preferences for different types of veterinary services

Figure 5 shows the summarised matrix-scoring diagram for service provider-qualities. The figure further shows that the levels of agreement ranged from low to high (W=0.220 to W=0.801) between the 12 informant groups for the service provider-qualities. Government veterinarians and Non-governmental organisations were strongly associated with the six qualities. The government, in comparison to the NGO, was more associated with fair cost for veterinary services, possession of appropriate professional knowledge and provision of a variety of services. The NGO was characterised more with frequency of visits, provision of advice and effectiveness of drugs/service offered. The herder and the hawker were weakly associated with the six qualities.

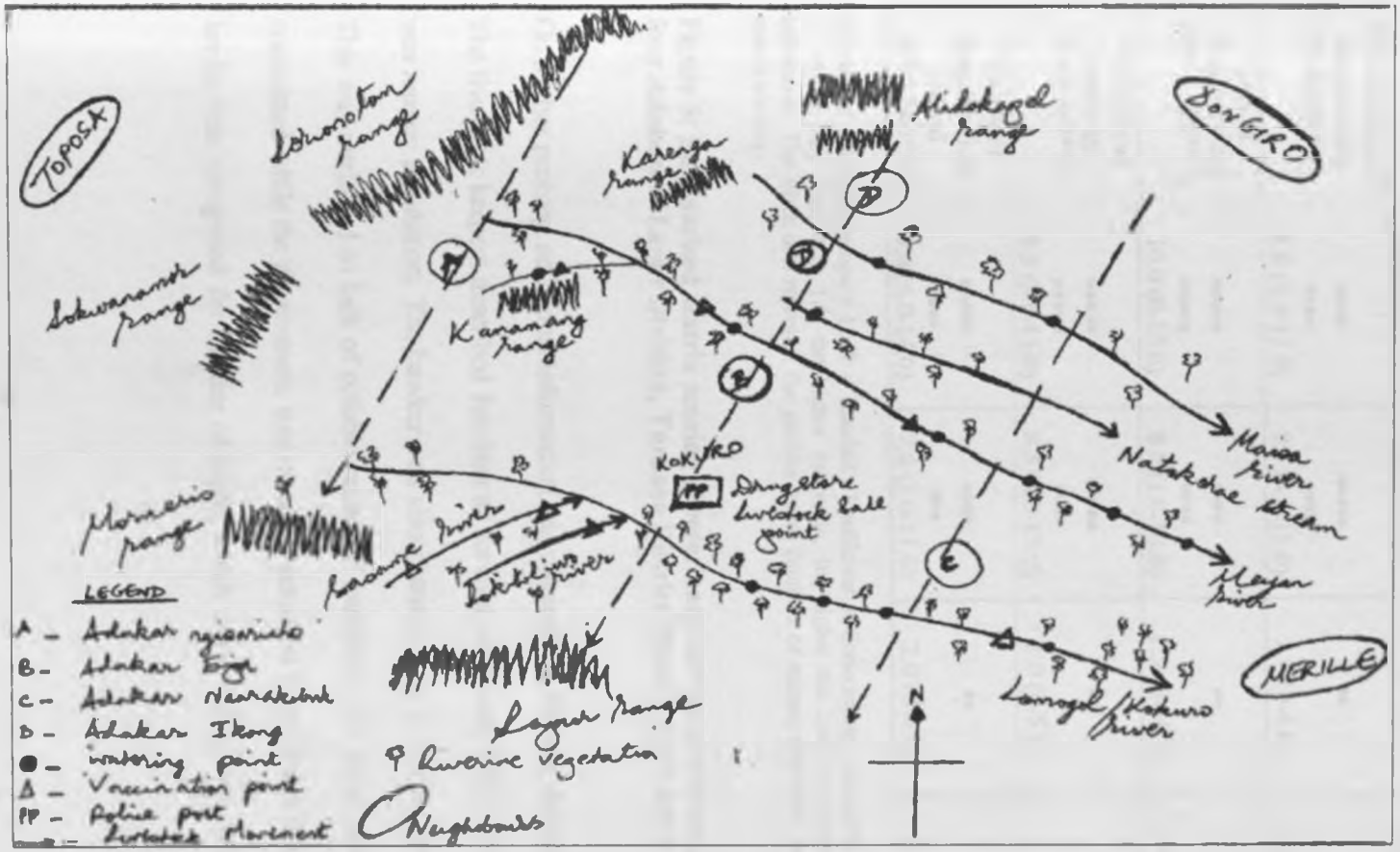

Figure 4: Map showing the location of the four *Adakars (Ikong, Ngisaricho, Naarakibuk and Eipa)* studied in Lapur Division of Turkana District (March/April 2002).

Quality	Government vet	NGO	Hawker	Herder
Frequency of visit (W=0.220*)	●●● ●● 5.0 (2.0-15.0)	●●● ●●● 5.5 (1.0-13.0)	●●● ●● 5.0 (0-10.0)	●● ● 3.0 (0-7.0)
Advice (W=0.582***)	●●●● ●●●● 8.0 (0-13.0)	●●●●● ●●●● 8.5 (0-15.0)	●● 2.0 (0-5.0)	●● 2.0 (0-3.0)
Effectiveness of drugs/service (W=0.801***)	●●●● ●●●● 8.0 (4.0-12.0)	●●●●● ●●●● 8.5 (4.0-11.0)	●● 2.0 (0-4.0)	●● 2.0 (0-4.0)
Cost of drugs/services (W=0.666***)	●●●●● ●●●●● 10.0 (0-15.0)	●●●● ●●●● 8.0 (1.0-10.0)	●● 1.5 (0-10.0)	0 (0-6.0)
Professional knowledge (W=0.787***)	●●●●● ●●●●● 9.5 (3.0-15.0)	●●●●● ●●●● 8.5 (4.0-13.0)	●● 2.0 (0-5.0)	● 1.0 (0-3.0)
Variety of drugs/services offered (W=0.786***)	●●●●● ●●●● 9.0 (5.0-14.0)	●●●● ●●● 7.0 (3.0-11.0)	●● 2.0 (0-4.0)	●● 2.0 (0-5.0)

Number of informant groups = 12; W = Kendall's Coefficient of Concordance (*$p<0.05$; ***$p<0.001$). W values vary from 0 to 1.0; the higher the value, the higher the level of agreement between informants. The black dots represent the median scores (number of stones) that were used during the matrix scoring.

Figure 5: Summarised matrix scoring of veterinary service providers-qualities in four *Adakars* of Lapur Division, Turkana District (March/April 2002).

On further probing, additional information was obtained on the four service providers. The livestock keepers described hawkers as survival strategists whose major interest was money acquisition. The hawker was also characterised as having limited drugs. This was attributed to lack of reliable means of transport. The NGO was termed as committed while the government was slow and reluctant in provision of service. The herder was recognised for the use of herbs, which were well known to be available

locally and free of charge. Another important role played by the herder was to inform the GOK and the NGO of disease outbreaks.

4.4 Local community's perceptions of 'fair' prices, constraints and opportunities for veterinary services

4.4.1 'Fair' prices for veterinary services

The community's perception of losses and treatment costs arising from eight important diseases affecting the four livestock species is summarised in Table 1. The livestock keepers' perception of value losses resulting from the eight important livestock diseases ranged from an average of 59.9% to 72.6% of the total value of respective livestock species. The treatment cost for the diseases was perceived as a range from 62.8% to 69.2% of the total value of respective livestock species. Lost value emanating from tick infestation in sheep and goats was the lowest while that from CCPP was considered the highest. The herders were willing to incur a relatively high cost in treatment of mange in camels and a low cost in treatment of tick infestation in sheep and goats.

Table 1: Livestock keepers' perception of losses and treatment cost for eight diseases affecting cattle, camels, sheep and goats and donkeys in four *Adakars* of Lapur Division, Turkana District (March/April 2002).

		bloul	blout	benol	benot	gloul	golout	goemal	goemat
N	Valid	50	50	51	51	48	48	48	48
	Missing	1	1	0	0	3	3	3	3
Mean (%)		64.82	63.30	66.65	67.20	72.60	69.19	59.96	62.75

		calotl	calott	caekol	caekot	doenol	doenot	dolokicl	dolokict
N	Valid	49	49	49	49	49	49	49	49
	Missing	2	2	2	2	2	2	2	2
Mean (%)		71.04	69.24	68.18	66.18	70.04	67.35	68.37	68.20

Key: bloul=Lost value associated with CBPP in cattle; blout=Treatment cost associated with CBPP in cattle; calott=Treatment cost associated with trypanosomosis in camels; caekol=Lost value associated with mange in camels; benol=Lost value associated with anthrax in cattle; caekot=Treatment cost associated with mange in camels; benot=Treatment cost associated with anthrax in cattle; doenol=Lost value associated with anthrax in donkeys; gloul=Lost value associated with CCPP in sheep and goats; doenot=Treatment cost associated with anthrax in donkeys; golout=Treatment cost associated with CCPP in sheep and goats; dolokicl=Lost value associated with black quarter in donkeys; goemal=Lost value associated with tick infestation in sheep and goats; dolokictt=Treatment cost associated with black quarter in donkeys; goemat=Treatment cost associated with tick infestation in sheep and goats; calotl=Lost value associated with trypanosomosis in camels

Table 2 and Figures 6 and 7 show the relationship between the sexes of livestock keepers and their perception of losses caused by the eight important diseases and associated treatment costs in all the four species of livestock. Female livestock keepers considered the losses relatively higher (75.6%) compared to their male counterparts (54.4%). This was the same case with the results obtained in the assessment of livestock keepers' perception of the treatment costs for the diseases in the four species. Again, the females were willing to pay more (74.9%) for treatment compared to the males (53.1%).

Table 2: Mean lost value and treatment cost associated with priority livestock diseases by gender in four *Adakars* of Lapur Division, Turkana District (March/April 2002).

SEX	N	MEANLV (%)	MEANTC (%)
Female	26	75.57	74.94
Male	25	54.44	53.08

Key:

N	Number of informants
MEANLV	Mean lost value associated with livestock diseases
MEANTC	Mean treatment cost associated with livestock diseases

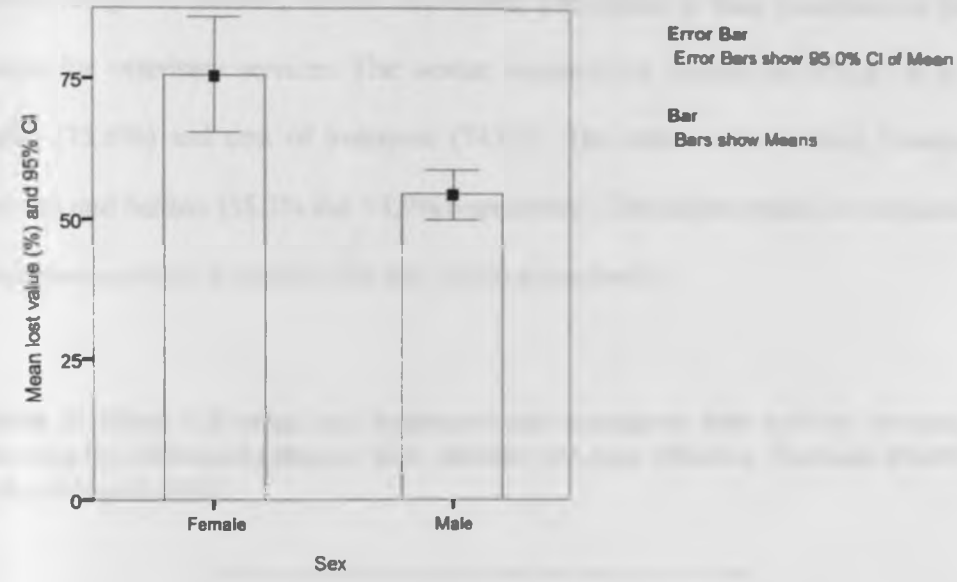

Figure 6: Mean lost value (%) associated with priority livestock diseases by gender in four *Adakars* of Lapur Division, Turkana District (March/April 2002).

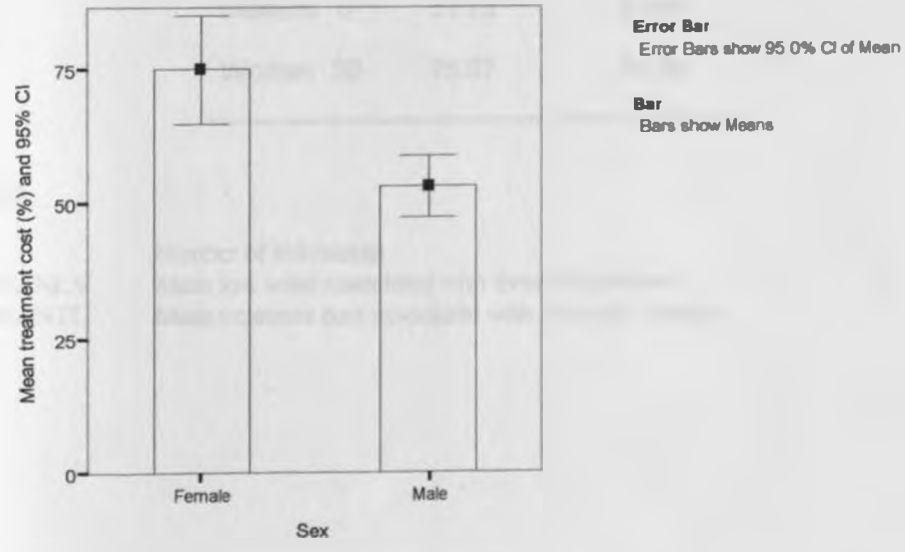

Figure 7: Mean treatment cost (%) associated with priority livestock diseases by gender in four *Adakars* of Lapur Division, Turkana District (March/April 2002).

Table 3 and Figures 8 and 9 provide a summary of the comparison across the three group categories (herders, women and elders) with regard to their perception of fair prices for veterinary services. The women reported the highest percentage on lost value (75.6%) and cost of treatment (74.9%). The elders were midway between women and herders (55.3% and 53.9% respectively). The herders rated lost value and treatment costs the lowest (51.8% and 50.6% respectively).

Table 3: Mean lost value and treatment cost associated with priority livestock diseases by informant group in four *Adakars* of Lapur Division, Turkana District (March/April 2002).

GROUP	N	MEANLV (%)	MEANTC (%)
Elders	19	55.29	53.85
Herders	6	51.75	50.63
Women	26	75.57	74.94

Key:

N	Number of informants
MEANLV	Mean lost value associated with livestock diseases
MEANTC	Mean treatment cost associated with livestock diseases

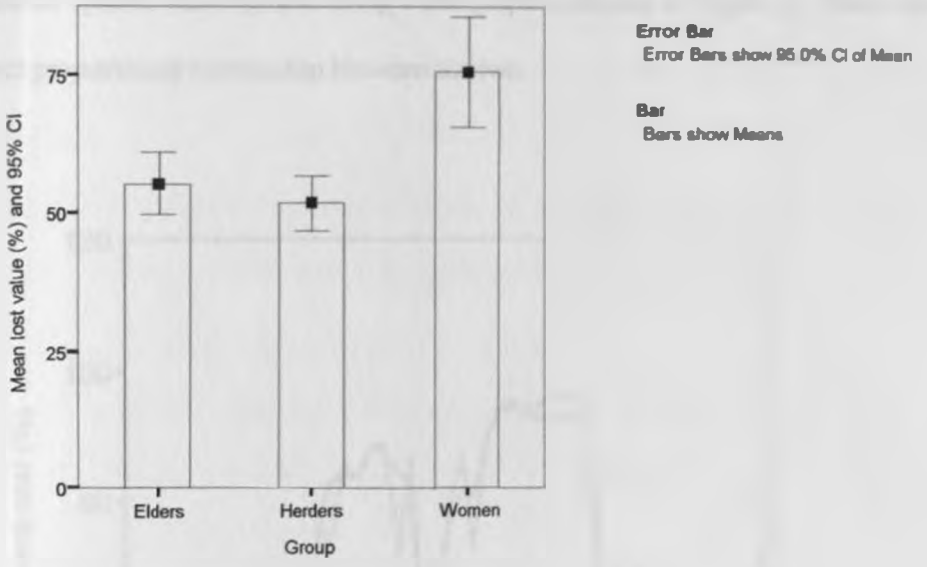

Figure 8: Mean lost value (%) associated with priority livestock diseases by informant group in four *Adakars* of Lapur Division, Turkana District (March/April 2002).

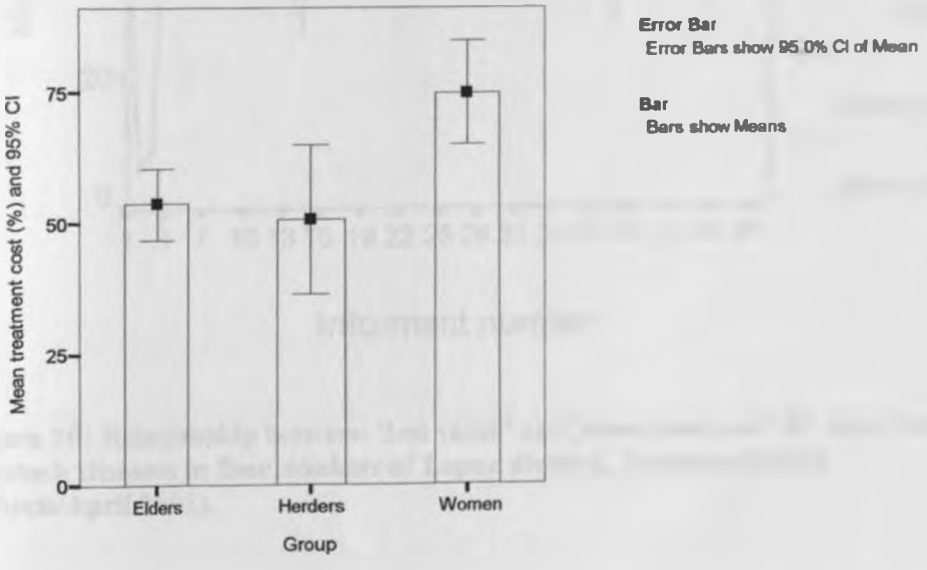

Figure 9: Mean treatment cost (%) associated with priority livestock diseases by informant group in four *Adakars* of Lapur Division, Turkana District (March/April 2002).

The relationship between lost value and treatment cost for the eight diseases in all the livestock species was explored using a line graph as shown in Figure 10. There was a direct proportional relationship between the two.

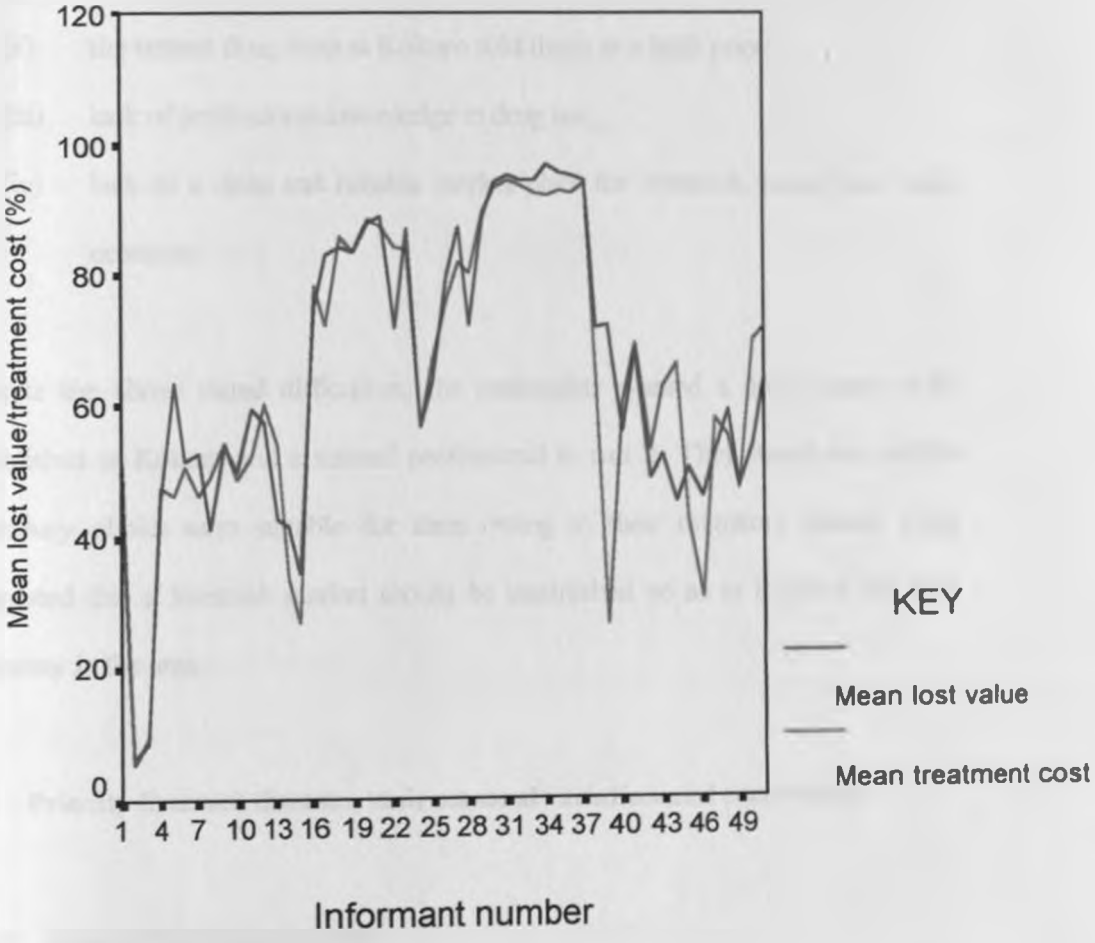

Figure 10: Relationship between 'lost value' and 'treatment cost' for important livestock diseases in four *Adakars* of Lapur division, Turkana District (March/April 2002).

4.4.2 Constraints and opportunities for veterinary services

The livestock keepers enumerated the constraints they faced in access to veterinary services as:

(i) great distances between the livestock owners and drug shops;

(ii) the nearest drug shop at Kokuro sold drugs at a high price;

(iii) lack of professional knowledge in drug use;

(iv) lack of a close and reliable market place for livestock, hence poor cash economy.

Despite the above stated difficulties, the pastoralists wanted a drug centre to be established at Kokuro and a trained professional to run it. They stated that mobile veterinary clinics were suitable for them owing to their migratory nature. They suggested that a livestock market should be established so as to improve the cash economy in the area.

4.5 Priority livestock diseases, their seasonal variation and occurrence

4.5.1 Priority livestock diseases

The herders enumerated five priority livestock diseases for the five livestock species kept in the area (camel, sheep and goats, cattle and donkeys). The diseases affecting camels were *Lotorobuo, Ekoto, Logoroi, Lolewa*, and *Emadang'*. The diseases associated with cattle were *Loukoi, Lokio, Enomokere, Lokit* and *Long'okuo. Enomokere, Lokicuma, Emadang', Lokit*, and *Etune* affected sheep and goats.

Enomokere, Lokicuma, Koriang' and *Lotorobuo* were named as priority diseases affecting donkeys. Matrix scoring of disease-signs on the above diseases suggested they could be as follows:

Lotorobuo - Trypanosomosis

Ekoto - Mange

Logoroi - Hemorrhagic septicemia

Lolewa - Diarrhea

Emadang' - Tick infestation

Loukoi - CBPP/CCPP

Lokio - Rinderpest

Enomokere - Anthrax

Lokit - Ear infection, mostly associated with ticks

Long'okuo - Rabies

Lokicuma - Blackquater

Koriang' - Impacted colon

Etune. - Goat pox/Sheep pox

4.5.2 Seasonal variation of priority livestock diseases

4.5.2.1 Donkey diseases

The seasonality in donkey diseases is summarised in Figure 11. The results indicate that Blackquater *(Lokicuma),* Anthrax *(Enomokere),* and Trypanosomosis *(Lotorobuo)* affected donkeys most commonly during *Akiporo* (the rainy season).

Feacal impaction *(Koriang')* was observed more frequently in *Akamu* (the dry season). There was a generally good agreement between the four groups of informants for seasonality of Blackquater *(Lokicuma)* (W=0.705), Feacal impaction *(Koriang')* (W=0.929) and Anthrax *(Enomokere)* (W=0.717). On further probing of livestock keepers, Blackquater *(Lokicuma)* and Anthrax *(Enomokere)* were associated with the rainy season because they believed that these diseases affected donkeys with good body condition. A thorny shrub known as *Emekui* that was a dominant form of vegetation in the dry season was implicated as the cause of Feacal impaction *(Koriang')*. This is why the disease was observed most commonly in *Akamu* (Dry season).

Disease	*Akiporo* (Rainy season) January-May	*Akiit* (Interphase) June	*Akamu* (Dry season) July-December
Lokicuma (W=0.705)	●●●●● ●●●● 9.0 (5.0-15.0)	●● ●● 4.0 (0-5.0)	●● 2.0 (0-5.0)
Koriang' (W=0.929*)	0 (0-0)	● 1.0 (0-3.0)	●●●●● ●●●●● ●●●● 14.0 (12.0-15.0)
Enomokere (W=0.717)	●●●●● ●●●●● 9.5 (5.0-15.0)	●● ●● 3.5 (0-7.0)	●● 2.0 (0-3.0)
Lotorobuo (W=0.117)	●●●●● ●●●●● 9.5 (0-15.0)	● 1.0 (0-5.0)	●●● ●● 4.5 (0-10.0)

Number of informant groups = 4; W, Kendall's coefficient of concordance (*p<0.05). The black dots represent the number of stones/pebbles that were used during the construction of the seasonal calendar. Medians are presented. A high number of dots indicated a relatively strong association between a disease and season, whereas a low number of dots indicated a weak association.

Figure 11: Summarised seasonal calendar for donkey diseases in four *Adakars* of Lapur Division, Turkana District (March/April 2002).

4.5.2.2 Sheep and goat diseases

The seasonal calendar of sheep and goat diseases is summarised in Figure 12. CCPP *(Loukoi)* and Anthrax *(Enomokere)* affected sheep and goats mostly during the *Akiporo* (Rainy season) and *Akiit* (the interphase between the rainy and dry seasons). *Akamu* (Dry season) was the period when Goat pox *(Etune)* and Tick infestation *(Emadang')* were observed frequently relative to the others. Ear infection *(Lokit)* was reported to occur throughout the year. On further questioning, the livestock keepers explained that CCPP *(Loukoi)* was common during the rainy season due to increased contact between the animals in shared water pools that characterise this season. In the dry season CCPP *(Loukoi)* was reported to be less frequent due to decreased contact between the animals as the number of water sources decreased and became personalised. Goat pox *(Etune)* and Tick infestation *(Emadang')* were associated with the dry season due to starvation that the livestock keepers believed made the animals more susceptible to these diseases. Anthrax *(Enomokere)* was associated with the rainy season when the body condition of the animals was good. There was a good agreement between informant groups on the seasonality of CCPP *(Loukoi)* (W=0.500), Tick infestation *(Emadang')* (W=0.667) and Anthrax *(Enomokere)* (W=0.333). There was no agreement in the seasonality of Ear infection *(Lokit)* (W=0.000).

Disease	*Akiporo* (Rainy season) January-May	*Akiit* (Interphase) June	*Akamu* (Dry season) July-December
Loukoi (W=0.500)	●●●● ●●● 7.0 (5.0-10.0)	●●● ●● 5.0 (2.0-5.0)	●● ● 3.0 (3.0-5.0)
Etune (W=0.091)	●● ● 3.0 (2.0-10.0)	●● ● 3.0 (3.0-5.0)	●●●●● ●●●● 9.0 (0-10.0)
Emadang' (W=0.667)	●● 2.0 (2.0-5.0)	●● ● 3.0 (3.0-5.0)	●●●●● ●●●●● 10.0 (5.0-10.0)
Lokit (W=0.000)	●●● ●● 5.0 (2.0-10)	●● ●● 4.0 (3.0-5.0)	●●● ●● 5.0 (1.0-10.0)
Enomokere (W=0.333)	●●●● ●●●● 8.0 (2.0-10.0)	●●● ●● 5.0 (3.0-10.0)	●● 2.0 (2.0-3.0)

Number of informant groups = 4; W, Kendall's coefficient of concordance. The black dots represent the number of stones/pebbles that were used during the construction of the seasonal calendar. Medians are presented (95% confidence limits). A high number of dots indicated a relatively strong association between a disease and season, whereas a low number of dots indicated a weak association.

Figure 12: Summarised seasonal calendar for sheep and goat diseases in four *Adakars* of Lapur Division, Turkana District (March/April 2002).

4.5.2.3 Camel diseases

Figure 13 shows the summarised seasonal calendar for camel diseases. Trypanosomosis *(Lotorobuo)* was observed most commonly during the rainy and dry seasons. Tick infestation *(Emadang')* and Mange *(Ekoto)* occurred throughout the year. Diarrhea *(Lolewa)* and Haemorrhagic septicaemia *(Logoroi)* affected camels more in the rainy season. There was a good agreement between the four groups of

informants for seasonality of Diarrhea *(Lolewa)* (W=0.942), Haemorrhagic septicaemia *(Logoroi)* (W=0.517) and Trypanosomosis *(Lotorobuo)* (W=0.317).

Disease	*Akiporo* (Rainy season) January-May	*Akiti* (Interphase) June	*Akamu* (Dry season) July-December
Lotorobuo (W=0.317*)	●●● ●● 5.0 (0-8.0)	●● 1.5 (0-5.0)	●●●● ●●●● 7.5 (4.0-15.0)
Emadang' (W=0.000)	●●● ●● 5.0 (0-8.0)	●●● ●● 4.5 (4.0-5.0)	●●● ●● 5.0 (3.0-11.0)
Lolewa (W=0.942***)	●●●●●●●●●● ●●●●● 15.0 (8.0-15.0)	0 (0-3.0)	0 (0-4.0)
Ekoto (W=0.050)	●●● ●●● 6.0 (3.0-10.0)	●● ●● 4.0 (0-6.0)	●●● ●● 4.5 (2.0-10.0)
Logoroi (0.517**)	●●●●● ●●●● 9.0 (5.0-15.0)	●● 1.5 (0-3.0)	●● ●● 3.5 (0-9.0)

Number of informant groups = 4; W, Kendall's coefficient of concordance (*p<0.05; **p<0.01; ***p<0.001). The black dots represent the number of stones/pebbles that were used during the construction of the seasonal calendar. Medians are presented. A high number of dots indicated a relatively strong association between a disease and season, whereas a low number of dots indicated a weak association.

Figure 13: Summarised seasonal calendar for camel diseases in four *Adakars* of Lapur Division, Turkana District (March/April 2002).

4.5.2.4 Cattle diseases

The seasonality of cattle diseases is summarised in Figure 14. All the priority diseases occurred commonly in the rainy and dry seasons with the exception of Rinderpest *(Lokio)* that affected cattle throughout the year. There was a good agreement between the groups of informants for seasonality of CBPP *(Loukoi)* (W=0.438) and Rabies *(Long'okuo)* (W=0.317).

Disease	*Akiporo* (Rainy season) January-May	*Akiil* (Interphase) June	*Akamu* (Dry season) July-December
Lokit (W=0.205)	●●● ●●● 6.0(0-9.0)	●●● 3.0(0-5.0)	●●● ●● 5.0(3.0-15.0)
Loukoi (W=0.438**)	●●● ●●●● 7.0(3.0-10.0)	●● ●● 3.5(0-4.0)	●●● ●● 5.0(4.0-8.0)
Lokio (W=0.017)	●●● ●● 5.0(3.0-13.0)	●● ●● 3.5(1.0-9.0)	●● ●● 4.0(0-9.0)
Enomokere (W=0.188)	●●● ●●● 6.0(0-9.0)	●●● 3.0(2.0-5.0)	●●● ●●● 6.0(3.0-11.0)
Long'okuo (W=0.317*)	●●● ●●● 6.0(0-15.0)	●● 1.5(0-5.0)	●●●● ●●●● 7.5(0-10.0)

Number of informant groups = 4; W. Kendall's coefficient of concordance (*p<0.05; **p<0.01). The black dots represent the number of stones/pebbles that were used during the construction of the seasonal calendar. Medians are presented. A high number of dots indicated a relatively strong association between a disease and season, whereas a low number of dots indicated a weak association.

Figure 14: Summarised seasonal calendar for cattle diseases in four *Adakars* of Lapur Division, Turkana District (March/April 2002).

4.5.3 Occurrence of priority livestock diseases

4.5.3.1 Donkey diseases

Estimates of disease prevalence in adults, foals and all age groups combined are summarized in Table 4 and Figures 15 and 16. Proportional piling results showed similar prevalence in the four diseases for both adults and foals. Anthrax *(Enomokere)*

had the highest prevalence in the two age groups (14.2% and 11.8% in adults and foals respectively). The lowest prevalence was recorded in Feacal impaction *(Koriang')* for both age groups (9.9% and 6.2% in adults and foals respectively). The prevalence of priority diseases increased with age. For example, the mean prevalence of Blackquater *(Lokicuma)* was 9.3% in foals but peaked to 11.7% in adults. This trend was true with the other three diseases. When all age groups of donkeys were considered, Anthrax *(Enomokere)* was the most commonly observed disease affecting approximately 13% of the donkey population in the year 2001. The lowest prevalence was seen in Feacal impaction *(Koriang')* (8.1%). The mean prevalence of Blackquater *(Lokicuma)* and Trypanosomosis *(Lotorobuo)* were 10.5% and 9.2% respectively.

Table 4: Mean annual prevalence (%) of important donkey diseases in adults, foals and all age groups in four *Adakars* of Lapur Division, Turkana District (2001-2002).

AGE CATEGORY	N	LOKICUMA	KORIANG'	ENOMOKERE	LOTOROBUO	OTHERS
Foals	47	9.32	6.19	11.83	7.56	1.13
Adults	47	11.74	9.97	14.16	10.77	0.23
All ages	47	10.53	8.08	12.99	9.16	0.68

Key:

N	Number of informants
LOKICUMA	Blackquater
KORIANG'	Impacted colon
ENOMOKERE	Anthrax
LOTOROBUO	Trypanosomosis
OTHER	Other diseases

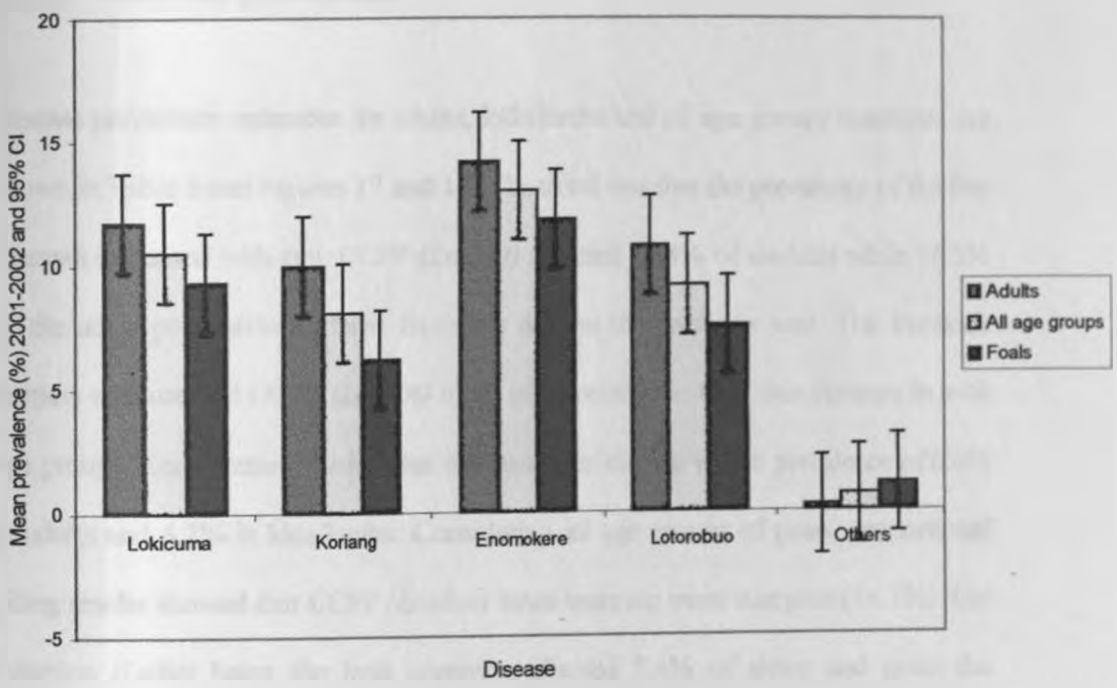

Figure 15: Mean annual prevalence (%) of important donkey diseases in adults, foals and all age groups in four *Adakars* of Lapur Division, Turkana District (2001-2002).

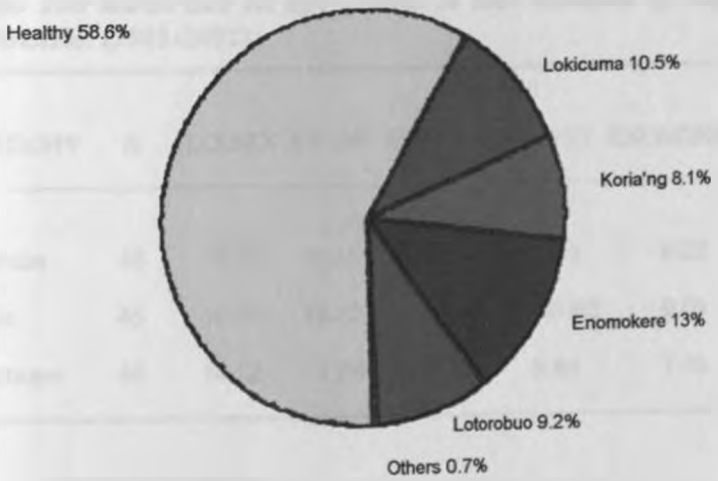

Figure 16: Mean annual prevalence (%) of important donkey diseases relative to healthy ones, all age groups, in four *Adakars* of Lapur Division, Turkana District (2001-2002).

4.5.3.2 Sheep and goat diseases

Disease prevalence estimates for adults, kids/lambs and all age groups combined are shown in Table 5 and Figures 17 and 18. The trend was that the prevalence of the five diseases increased with age. CCPP *(Loukoi)* affected 11.8% of the kids while 16.5% of the adult population suffered from the disease the previous year. The livestock keepers encountered CCPP *(Loukoi)* more often relative to the other diseases in both age groups. Ear infection *(Lokit)* was the least seen disease with a prevalence of 6.6% in adults and 4.2% in kids/lambs. Considering all age groups of goats, proportional piling results showed that CCPP *(Loukoi)* cases were the most common (14.1%). Ear infection *(Lokit)* being the least common affected 5.4% of sheep and goats the previous year.

Table 5: Mean annual prevalence (%) of important sheep and goat diseases in adults, kids and lambs and all age groups in four *Adakars* of Lapur Division, Turkana District (2001-2002).

AGE CATEGORY	N	LOUKOI	ETUNE	EMADANG'	LOKIT	ENOMOKERE	OTHERS
Kids/Lambs	45	11.79	9.94	5.50	4.24	6.22	4.78
Adults	45	16.46	12.62	7.09	6.65	9.09	2.09
All age groups	45	14.12	11.28	6.30	5.44	7.65	3.43

Key:

N	Number of informants
LOUKOI	CCPP
ETUNE	Goat/sheep pox
EMADANG'	Tick infestation
LOKIT	Ear infection
ENOMOKERE	Anthrax
OTHERS	Other diseases

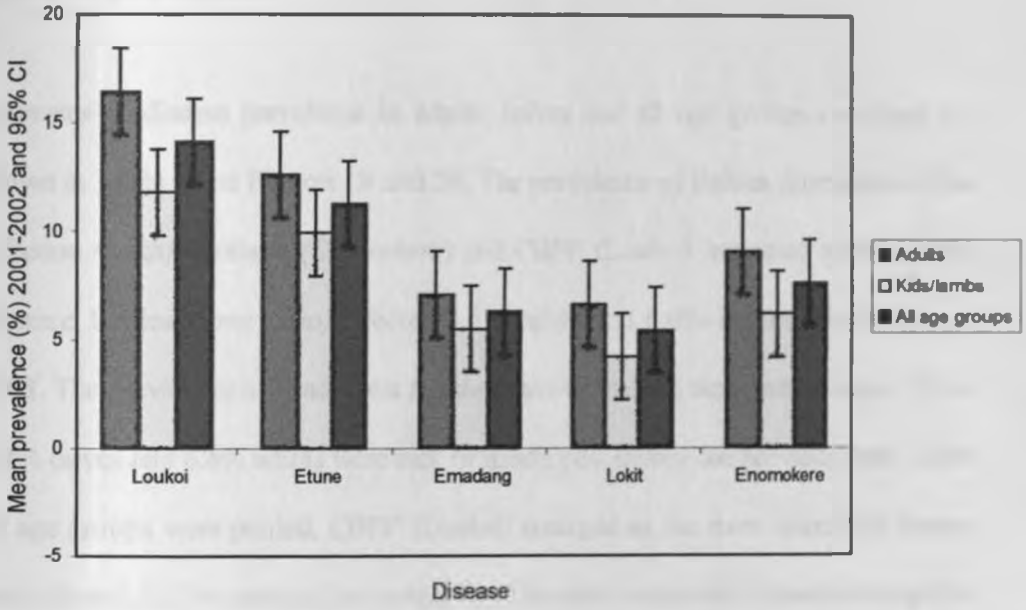

Figure 17: Mean annual prevalence (%) of important sheep and goat diseases in adults, kids/lambs and all age groups in four *Adakars* of Lapur Division, Turkana District (2001-2002).

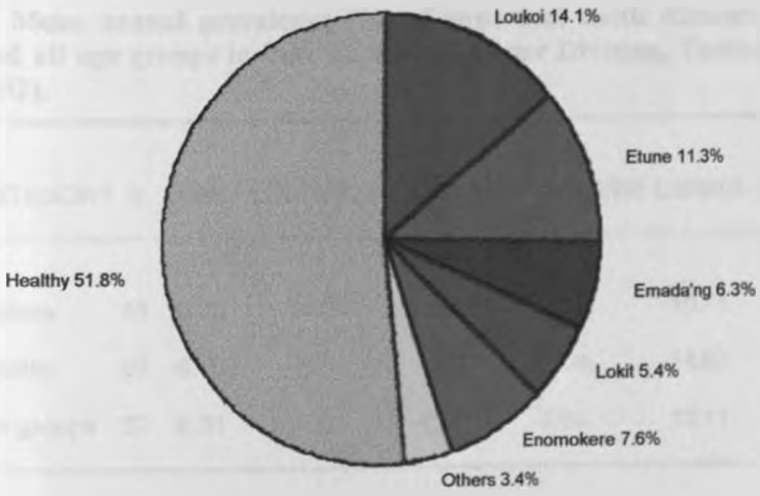

Figure 18: Mean annual prevalence (%) of important sheep and goat diseases relative to healthy ones, all age groups, in four *Adakars* of Lapur Division, Turkana District (2001-2002).

4.5.3.3 Cattle diseases

Estimates of disease prevalence in adults, calves and all age groups combined are shown in Table 6 and Figures 19 and 20. The prevalence of Rabies *(Long'okuo)*, Ear infection *(Lokit)*, Anthrax *(Enomokere)* and CBPP *(Loukoi)* increased with age. For instance, Rabies *(Long'okuo)* affected 4.5% calves and 6.0% adult cattle in the year 2001. The prevalence of Rinderpest *(Lokio)* was observed to decrease with age. About 6.7% calves and 6.6% adults were sick of Rinderpest *(lokio)* the previous year. When all age groups were pooled, CBPP *(Loukoi)* emerged as the most important disease that affected 12.1% cattle in the year 2001. The other important diseases arranged in their order of decreasing prevalence were Anthrax *(Enomokere)* (7.6%), Rinderpest *(Lokio)* (6.3%), Rabies *(Long'okuo)* (5.0%) and Ear infection *(Lokit)* (4.2%).

Table 6: Mean annual prevalence (%) of important cattle diseases in adults, calves and all age groups in four *Adakars* of Lapur Division, Turkana District (2001-2002).

AGE CATEGORY	N	LOKIO	LONGOKUO	LOKIT	ENOMOKERE	LOUKOI	OTHERS
Calves	51	6.73	4.52	3.88	6.98	10.71	9.29
Adults	57	6.60	6.00	4.98	9.04	14.63	6.82
All age groups	57	6.31	5.02	4.23	7.64	12.11	7.57

Key:

N	Number of informants
LOKIO	Rinderpest
LONG'OKUO	Rabies
LOKIT	Ear infection
ENOMOKERE	Anthrax
LOUKOI	CBPP
OTHERS	Other diseases

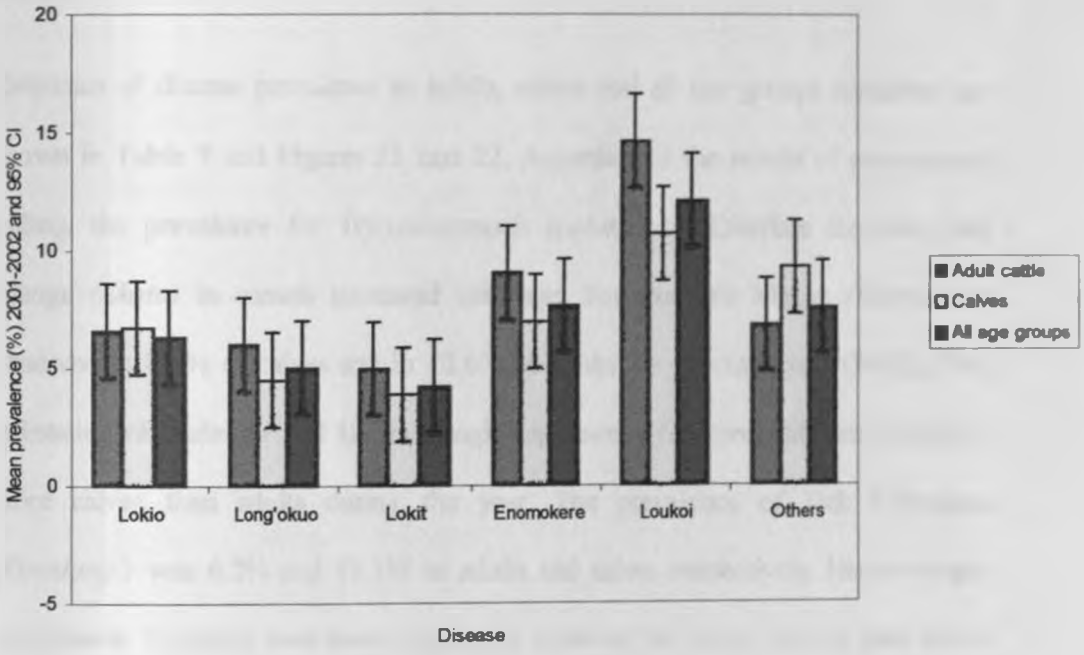

Figure 19: Mean annual prevalence (%) of important cattle diseases in adults, calves and all age groups in four *Adakars* of Lapur Division, Turkana District (2001-2002).

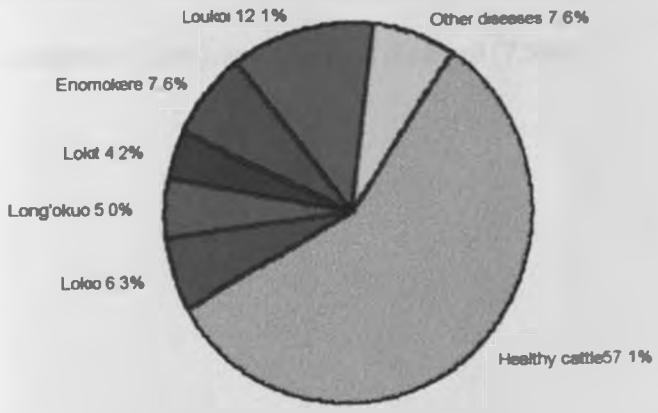

Figure 20: Mean annual prevalence (%) of important cattle diseases relative to healthy ones, all age groups, in four *Adakars* of Lapur Division, Turkana District (2001-2002).

4.5.3.4 Camel diseases

Estimates of disease prevalence in adults, calves and all age groups combined are shown in Table 7 and Figures 21 and 22. According to the results of proportional pilling, the prevalence for Trypanosomosis *(Lotorobuo)*, Diarrhea *(Lolewa)*, and Mange *(Ekoto)* in camels increased with age. For example Mange *(Ekoto)* was observed in 8.6% of calves and in 12.6% of adults the previous year (2001). Tick infestation *(Emadang')* and Haemorrhagic septicaemia *(Logoroi)* affected relatively more calves than adults during the year. The prevalence of Tick infestation *(Emadang')* was 6.2% and 10.1% in adults and calves respectively. Haemorrhagic septicaemia *(Logoroi)* was most commonly observed in calves (8.2%) than adults (7.3%) in the same year. When the whole camel population was considered irrespective of the age group, Trypanosomosis *(Lotorobuo)* had the highest prevalence (11.1%). The prevalence of the other diseases in the order of decreasing frequency were; Mange *(Ekoto)* (10.6%), Tick infestation *(Emadang')* (8.1%), Haemorrhagic septicaemia *(Logoroi)* (7.8%), and Diarrhea *(Lolewa)* (7.5%).

Table 7: Mean annual prevalence (%) of important camel diseases in adults, calves and all age groups in four *Adakars* of Lapur Division, Turkana District (2001-2002).

AGE CATEGORY	N	LOTOROBUO	EMADANG	LOLEWA	EKOTO	LOGOROI	OTHERS
Calves	49	6.99	10.07	6.82	8.62	8.19	6.55
Adults	59	15.11	6.17	8.18	12.64	7.31	1.71
All age groups	59	11.05	8.12	7.50	10.63	7.75	4.13

Key:

N	Number of informants
LOTOROBUO	Trypanosomosis
EMADANG	Tick infestation
LOLEWA	Diarrhea
EKOTO	Mange
LOGOROI	Hemorrhagic septicemia
OTHERS	Other diseases

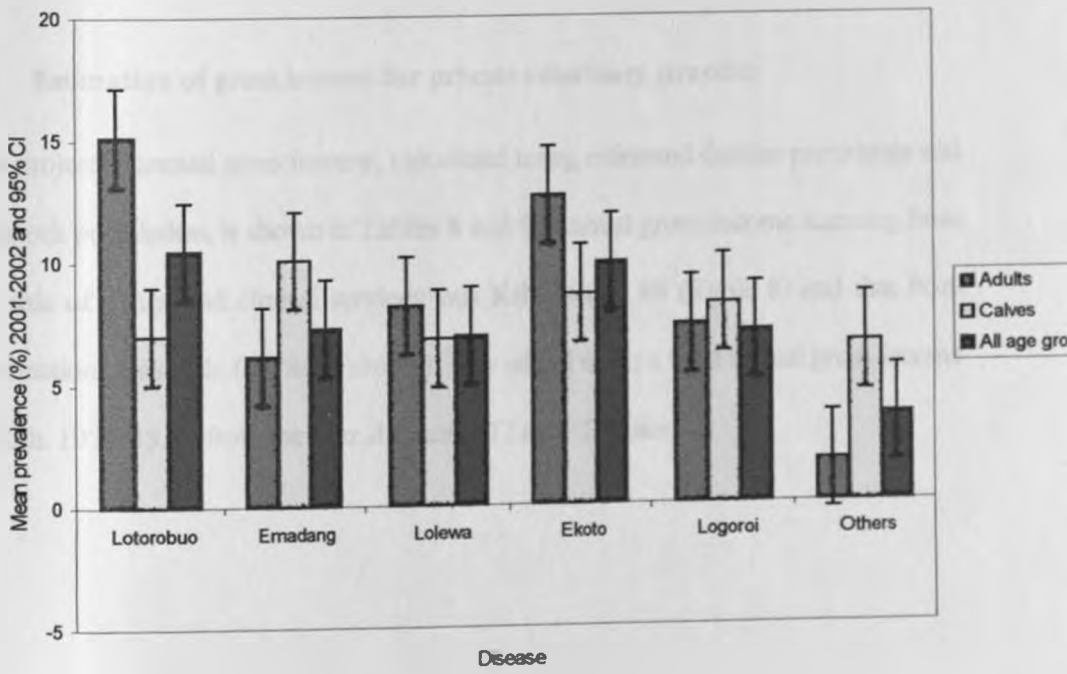

Figure 21: Mean annual prevalence (%) of important camel diseases in adults, calves and all age groups in four *Adakars* of Lapur Division, Turkana District (2001-2002).

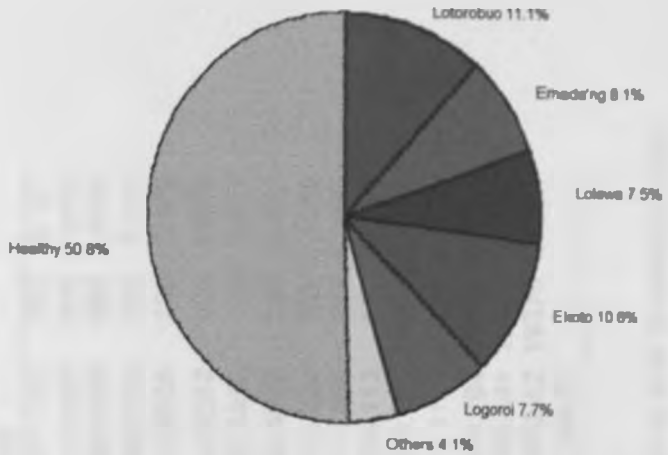

Figure 22: Mean annual prevalence (%) of important camel diseases relative to healthy ones, all age groups, in four *Adakars* of Lapur Division, Turkana District (2001-2002).

4.6 Estimation of gross income for private veterinary practice

The projected annual gross income, calculated using estimated disease prevalence and livestock population, is shown in Tables 8 and 9. Annual gross income accruing from the sale of drugs and clinical services was Ksh 44,654.89 (Table 8) and that from vaccinations was Ksh. 62,789 (Table 9). This added up to a total annual gross income of Ksh. 107,443.89 from the four *Adakars* of Lapur Division.

Table 8: Expected annual drug sales and clinical service schedule for four *Adakars* of Lapur Division, Turkana District (2001-2002).

Cases	Species	E/cases	D/type	R/dose(cc)	D/Cost (Ksh)	Cost/ml (Ksh)	C/dose (Ksh)	T/costs (Ksh)	T/sales (Ksh)	G/income (Ksh)	T/pop	D/inc
CBPP	Cattle	109.51	Oxytet 10%	40	169	1.69	67.6	7402.538	10363.553	2961.015	905	0.121
E/infection	Cattle	38.26	Oxytet 10%	40	169	1.69	67.6	2586.667	3621.3338	1034.667	905	0.0423
Anthrax	Cattle	69.15	Oxytet 10%	40	169	1.69	67.6	4674.244	6543.9415	1869.698	905	0.0764
Surra	Camel	21.66	Triquin	12	280	18.667	224	4851.84	6792.576	1940.736	190	0.114
Mange	Camel	20.52	Triatix	4	169	1.69	6.76	138.7152	194.20128	55.48608	190	0.108
T/infestation	Camel	15.01	Triatix	2	169	1.69	3.38	50.7338	71.02732	20.29352	190	0.079
H/sept	Camel	14.63	Oxytet 10%	40	169	1.69	67.6	988.988	1384.5832	395.5952	190	0.077
Diarrhoea	Camel	14.44	Oxtytet 10%	40	169	1.69	67.6	976.144	1366.6016	390.4576	190	0.076
Blackquarter	Donkey	54.95	Amoxicillin	40	484	4.84	193.6	10638.1	14893.337	4255.239	522	0.1053
Anthrax	Donkey	67.83	Oxytet 10%	40	169	1.69	67.6	4585.219	6419.3063	1834.088	522	0.1299
Tryps	Donkey	47.84	Triquin	12	280	18.667	224	10715.28	15001.395	4286.113	522	0.0916
CCPP	Shoats	2735.75	Oxytet 10%	5	169	1.69	8.45	23117.09	32363.923	9246.835	19375	0.1412
T/infestation	Shoats	1218.69	Triatix	0.5	169	1.69	0.845	1029.791	1441.7073	411.9164	19375	0.0629
Anthrax	Shoats	1482.19	Oxytet 10%	5	169	1.69	8.45	12524.48	17534.278	5009.794	19375	0.0765
G/S pox	Shoats	2183.56	Oxytet 10%	5	169	1.69	8.45	18451.1	25831.544	7380.441	19375	0.1127
E/infection	Shoats	1054	Oxytet 10%	5	169	1.69	8.45	8906.3	12468.82	3562.52	19375	0.0544
TOTAL								111,637.2	156,292.1	44,654.89		

Key: E/infection=Ear infection; T/infestation=Tick infestation; H/sept=Haemorrhagic septicaemia; Tryps=Trypanosomosis; G/S pox=Goat and sheep pox; E/cases=Expected cases; D/type=Drug type; D/inc=Disease incidence; R/dose=Required dose D/cost=Drug cost; C/dose=Cost per dose; T/pop=Total population; T/sales=Total sales; T/costs=Total costs; G/income=Gross income; Oxytet=Oxyteteracycline

Table 9: Expected annual vaccination schedule for four *Adakars* of Lapur Division, Turkana District (2001-2002).

Disease	Species	D/type	R/dose	C/dose (Ksh)	C/annum (Ksh)	S/p/dose (Ksh)	S/annum (Ksh)	G/income (Ksh)	T/pop
CBPP	Cattle	CBPP vacc	1 dose	4	3620	5	4525	905	905
Anthrax	Cattle	Anthrax vacc	1 dose	3.58	3239.9	4.58	4144.9	905	905
Rinderpest	Cattle	R/vacc	1 dose	6	5430	7	6335	905	905
Rabies	Cattle	Rabies vacc	1 dose	35	31675	36	32580	905	905
B/quarter	Donkey	Bq/vacc	1 dose	3.1	1618.2	4.1	2140.2	522	522
Anthrax	Donkey	Anthrax vacc	1dose	3.58	1868.76	4.58	2390.76	522	522
Anthrax	Shoats	Anthrax vacc	1 dose	3.58	69362.5	4.58	88737.5	19375	19375
Pox	Shoats	Pox vacc	1 dose	4	77500	5	96875	19375	19375
CCPP	Shoats	CCPP vacc	1 dose	9.5	184062	10.5	203437.5	19375	19375
TOTAL					378,376		441,165.9	62,789	

Key: Bq/vacc=Black quarter vaccine; R/vacc=Rinderpest vaccine; B/quarter=Blackquarter; Vacc=Vaccine; D/type=Drug type; R/dose=Requirements per dose; C/dose=Cost per dose; C/annum=Cost per annum; S/p/dose=Selling price per dose G/income=Gross income; T/pop=Total population; S/annum=Sales per annum

5.0 DISCUSSION

The results of this study describe the market information required for business planning of a private pastoral veterinary practice in the four *Adakars* of Lapur Division of Turkana District, Kenya.

In the current study, livestock keepers themselves drew a veterinary service and opportunity map. The map vividly revealed a number of features that include the boundaries of the community space, livestock grazing/movement patterns and current veterinary services. In the past, mapping has popularly been used in animal health surveys. The various types of maps include opportunities and service maps (IIED and Action Aid Ethiopia, 1992; Rees *et al.*, 1998), social maps (IIED and Action Aid Ethiopia, 1992; Braganca, 1994), livestock mobility and grazing maps (Hadrill and Haroon, 1994; Mearns *et al.*, 1994) and natural resource maps (Aden and Catley, 1993; Mearns *et al.*, 1994).

This information could serve well in business planning for a private pastoral veterinary practice. The boundary of the map defines the target area for the business and could further assist the veterinarian in estimation of costs that may be required for adequate coverage of the clientele with regard to distances to be travelled. Due to the mobile nature of pastoralists with their animals, it is common that accessibility becomes difficult or rather impossible at certain times of the year. With regard to private practice, this may translate to a decrease in business performance which could be avoided through strategic planning to facilitate access to livestock camps at

different times of the year as illustrated by livestock movement patterns in the map. A similar participatory methodology was employed by Yusuf (1992) who mapped pastoral movements of communities in the Sanaag region of Somaliland. The seasonal migration patterns confirmed that herders were likely to be in a certain area during a particular season of the year. This knowledge assisted in the planning of drug distribution to beneficiaries of a livestock rehabilitation programme set up by ActionAid in the area. A drug shop was marked at Kokuro centre and several vaccination sites were also indicated in the map. Planning of a business calls for perfect knowledge of the existing competitors as provided in the map. This forms a basis for further probing with a view to learning the strengths and weaknesses of the potential competitors. In this study, the identification of a drug shop and vaccination sites laid a foundation for more questions about these animal health facilities and hence proper understanding of other players in animal health service provision.

Interviewing is the oldest and most widely used method of information gathering and the foundation for many other tools (Leyland, 1997). Interviews were used in the current study to identify existing animal health delivery systems, the services they offer and those that are potential candidates for privatisation. The livestock keepers recognised four animal health service providers in the area. These were: the Government Veterinary Department, an NGO (ITDG-EA), hawkers and traditional herbalists (herders). The Veterinary Department was associated with annual vaccinations against CBPP and rinderpest while ITDG-EA was well known for drug sales and training of herders on basic veterinary skills. When this information was triangulated with that from the map, it was found to be reliable as both participatory

methodologies yielded the same results. Although the hawkers sold drugs to pastoralists, they were rated as lacking in professional veterinary knowledge. The herders relied on traditional herbs besides the modern drugs obtained from the drugs shop at Kokuro centre. The pastoralists were aware of the existence of the government as a service provider, a situation that is contrary to the findings of Hefferman and Misturelli (2000) in Nairobi. In the latter study carried out in Kariobangi estate of Nairobi, the residents were unaware of nearby veterinary practices and/or the need to buy drugs specifically for livestock. This could be because livestock is the major source of livelihoods in a pastoral set up, making veterinary services a necessity for pastoralists, hence the need to be conscious of the providers of livestock services. This study also established that 15% of the households utilised government service for vaccination, the only service obtained by livestock keepers of Lapur Division from the Government's Veterinary Department. The inclusion of the herder as a service provider was a contrast to the results of a study by Hefferman (1992) on the primary livestock healthcare system and knowledge of livestock diseases and healing among Tibetan agropastoralists of the Himalayas. In this study, unlike other pastoralist societies, Tibetan laymen do not treat sick animals. Even in cases of dystocia, herders will not pull out calves, but refer to the two animal healers in the area.

Despite the general notion that pastoralists are reluctant to pay for veterinary services, the livestock keepers of Lapur Division expressed willingness to pay for several services. It therefore emerged that the sale of veterinary drugs, treatment of livestock and vaccination of livestock were the veterinary services that had the potential for privatisation, as the livestock owners were willing to pay for these services.

According to the above findings, it was therefore evident that there is limited veterinary service provision in this area. This situation is similar to the one described in other pastoral areas of Ethiopia (Godana, 1993), Eritrea (FAO, 1994), Uganda (Catley, 1997), and Kenya (Tambi *et al.*, 1997a; Hubl *et al.*, 1998).

The reports from these African countries show that there is limited development of conventional veterinary services in pastoral areas. Although privatisation has been identified as a potential solution in provision of veterinary services (de Haan and Bekure, 1991), Lapur Division had not attracted any private veterinary practitioner. AGREF (1995) listed Turkana among the districts that had not so far attracted any private practitioners and NGOs were the major providers of animal health services (Wamukoya *et al.*, 1995). The NGO involvement in provision of veterinary services is not peculiar to Turkana alone as NGOs also support veterinary services in Samburu and Baringo districts (Heffernan and Misturelli, 2000). In contrast to the situation in Turkana, Wamukoya *et al.* (1995) recorded up to eight private veterinary practices in high potential districts while extensive grazing areas such as Kajiado District registered only a single private veterinary practice. These differences may be explained by the fact that professionals were reluctant to work in pastoral areas due to inhibiting features that characterise pastoral areas such as expansive areas, harsh climate, poor infrastructure, and mobility of human populations. For private veterinarians wishing to set up practices, the information obtained from this study using semi-structured interviews could be part of their business plan. The practitioners can identify the services they intend to offer based on those that were being offered at the time of study or those proposed as potential candidates for privatisation.

Moreover, knowledge on current service providers would alert the practitioner on potential competition in the business venture.

A matrix scoring was used to explore local preferences for different types of veterinary service providers. Preference scoring as a PRA tool has been widely used for a variety of planning purposes (Mukherjee, 1992; Braganca, 1994; Mearns *et al.*, 1994; Scoones, 1994). The high agreement between informant groups showed that the matrix-scoring method was reproducible, and hence reliable. The Veterinary Department and an NGO working in the area were strongly associated with advice, effectiveness of service/drugs, professional knowledge, and a variety of drugs/service. The Veterinary Department was ranked first followed by the NGO, hawker and herder in order of decreasing preference. The scores for the Veterinary Department may have been exaggerated because the participants appeared to have a belief that the Government is supreme and this could influence independent scoring. The inclusion of advice as a criterion for scoring herders' preference for service providers was consistent with the results of a pairwise ranking for key parameters in drug purchasing by Heffernan and Misturelli (2000). The participants in this study ranked advice as the most desirable feature of a livestock drug store relative to proximity to home, type of drug, cost of drug and availability of credit.

The association of service providers with the criteria described above could reveal strengths and weaknesses of potential competitors. This would assist the private practitioner to devise strategies of competing favourably with the other service providers. For example, in this study, given that Veterinary Department was

associated with a low frequency of visits, a private practitioner can improve on contact with clients through increased visits, thereby winning their confidence. This would result in winning a relatively large share of the market.

Proportional piling has been widely used in the examination of a range of livestock issues (Catley, 1997; Catley and Irungu, 2000). This method was used to study local community's' perception of fair prices for veterinary services. CCPP *(Loukoi)* in goats was perceived as the disease causing the highest losses (72.6%) while Tick infestation *(Emadang')* in sheep and goats was associated with the lowest loss (60%). Contagious caprine pleuro-pneumonia was rated in this manner probably due to the high morbidity and mortality that characterises it. On the other hand Tick infestation *(Emadang')* may have been considered to cause the lowest loss due to its chronic nature/course with relatively low mortality. The treatment costs for Mange *(Ekoto)* in camels was the highest (69.2%) while that of Tick infestaion *(Emadang')* was the lowest (62.8%). There was consistency in the participants' perception of losses and treatment costs associated with Tick infestaion *(Emadang')*. This is indicated by the fact that the disease was rated lowest with regard to losses and treatment costs. This further confirms the reliability of the information obtained from the livestock owners. The women perceived the losses due to livestock diseases as being relatively high compared to their male counterparts who perceived them as low. This may be because women in a pastoral set up are most commonly involved in feeding the family on animal protein. They are therefore sensitive to any reduction in slaughter weights or deaths of lactating animals (source of milk) or any animal (source of blood) as this translates to reduction in food supply for the family. This may explain why women

demonstrated willingness to pay relatively higher cost for treatment of livestock - to safeguard the food supply for the family! Women also perceived treatment costs for livestock diseases as being relatively high compared to their male counterparts who perceived them as low. This finding is similar to that of Heffernan and Misturelli (2000) who found price to be a limiting factor in the purchase of veterinary drugs among men compared to women. The direct proportionality between the perceived losses and treatment costs depicts consistency in participants' perception and again confirms reliability of the information. This part of the study demonstrates that pastoralists are cognisant of the fact that diseases cause losses in the value of livestock. Closely linked with this is the fact that costs have to be incurred to reduce these losses and indeed livestock owners were willing to pay reasonably well for the veterinary services. A private veterinary practitioner may use the information on losses and costs associated with livestock diseases to set prices for veterinary drugs and services. For example, a higher charge can be set for treatment of a disease that was associated with high treatment cost and vice versa. The clientele would be content paying for charges they expected and this would limit chances of suspicion thereby enhancing their trust in the practitioner.

The herders omitted helminthosis in their list of priority diseases although they considered it among the group of diseases affecting livestock and more so in sheep and goats. In a similar study, Hadrill and Haroon (1992) carried out participatory research in Sanaag region of Somaliland and noted that helminths were considered by the herders to be less important. The reason for this could be the fact that the

pastoralists' knowledge of diseases is purely based on dramatic clinical events; hence diseases of a sub-clinical nature are missed or considered less important.

Analysis of seasonal calendars can be used to indicate seasonal variations in disease incidence. In this study, the livestock keepers scored the occurrence of priority livestock diseases across three seasons in a year for four livestock species. Seasonality in the occurrence of livestock diseases could be used in business planning of a private veterinary practice. The stocking of drugs and planning of business activities could be varied based on the period of the year and the prevalent diseases at the time. Through planning with seasons in mind, the losses commonly arising from expiry of drugs due to overstay on shelves would be avoided. For example, the herders in Lapur Division placed CCPP *(Loukoi)* in goats as a common disease during the rainy season. Based on it's seasonality, a private practitioner can plan to stock the drug store with adequate quantities of antibiotics besides an early vaccination of goats against CCPP. A seasonal disease calendar has been used before to plan a primary veterinary assistant training programme in Sanaag region of Somaliland (Hadrill and Haroon, 1992).

Prevalence of priority livestock diseases was estimated using proportional piling. CCPP *(Loukoi)* in sheep and goats was the most commonly observed disease relative to other livestock diseases with a prevalence of 14.1%. Ear infection *(Lokit)* in cattle and sheep and goats recorded the lowest prevalence of 4.2% and 5.4% respectively. This prevalence may have been exaggerated because informants, while expecting an immediate supply of drugs from the researcher, made their estimates high to secure a

huge quantity of drugs in return. In business planning for private veterinary practice the estimates on disease occurrence can be used in estimation of gross income that can be obtained in an area. The other information requirements are on livestock population, cost of drugs and drug dosages. In this study, direct observation may have underestimated the livestock populations especially for cattle because these were, at the time, grazed in the mountains (often reserved for dry season grazing) that were located far from the area of study. If this study was conducted in the mid rainy season, estimates of cattle numbers could have been more accurate. Hefferman (1992), while estimating livestock numbers for Tibetan agro-pastoralists, also noted season of the study as an important issue when estimating livestock numbers.

6.0 CONCLUSIONS AND RECOMMENDATIONS:

6.1 CONCLUSIONS

It was possible to use Participatory Rural Appraisal methodologies in obtaining most of the necessary information required for business planning of a private pastoral veterinary practice. The conclusions that could be drawn from this study include:

- ✓ The services the private veterinary practitioner could offer in Turkana District include sale of drugs, vaccinations and treatment of livestock.
- ✓ The Veterinary Department, NGOs, hawkers and herders themselves were the potential competitors of private veterinary practitioners in Turkana District.
- ✓ Livestock diseases remain a major constraint limiting productivity of livestock in the district and thus a market exists for provision of veterinary services.
- ✓ The livestock keepers were cognisant of the losses associated with livestock diseases and were willing to pay reasonably well for veterinary services aimed at treatment or control of these diseases.
- ✓ Great distances between the livestock owners and drug shops, poor infrastructure, high drug prices, lack of professional knowledge, and lack of an easily accessible market for livestock were the major constraints to the provision of veterinary services.

6.2 RECOMMENDATIONS

- ✓ Due to limited availability of quantitative data in pastoral areas of Africa, veterinarians wishing to venture into private practice should use Participatory Rural Appraisal methodologies to understand their potential markets.
- ✓ The Government of Kenya should give priority to private practitioners in pastoral areas when tendering for vaccination contracts, as this will boost their gross incomes.
- ✓ The Kenya Veterinary Association should prioritise support to veterinarians wishing to venture into private veterinary practice in pastoral areas.
- ✓ Herders are recognised as service providers in Turkana and therefore the veterinarians wishing to venture into private veterinary practice should train/involve them in their private practices so as to be able to enjoy economies of scale besides adequate coverage of the clientele.
- ✓ The Government should improve infrastructure in the district so as to attract private veterinary practices.
- ✓ Future research should focus on livestock marketing with a view to improving it, which would, in turn, improve the cash economy.

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8.0 APPENDICES

8.1 APPENDIX I

Checklist for identification of veterinary services offered, services for privatisation, constraints and opportunities for veterinary services

1. Introduce the appraisal team
2. Identify the respondents
3. Enumerate veterinary services providers and veterinary services they offer
4. Identify veterinary services that can be privatised
5. Identify constraints and opportunities for veterinary services

8.2 APPENDIX II

The question list used in semi-structured interview

1. Have your animals been sick before?
2. When was the last time your animals were sick?
3. What happened to the sick animals?
4. Are there any veterinary service providers in this area?
5. What services do these providers offer?
6. Are these services offered free of charge or you pay for them?
7. Do you pay for any veterinary services?
8. Which veterinary services do you pay for or are you willing to pay for?
9. Are there any difficulties in obtaining veterinary services in this area? If so, which ones?
10. In your own opinion what can be done to improve the delivery of animal health services in this area?