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USAID/Uganda Karamoja Resilience Support Unit

VETERINARY SERVICES IN KARAMOJA, UGANDA: A REVIEW

Dawit Abebe
November 2016



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USAID/UGANDA KARAMOJA RESILIENCE SUPPORT UNIT

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ABBREVIATIONS AND ACRONYMS

AHA	Animal Health Assistant
AHO	Animal Husbandry Officer
AHSP	Animal Health Service Provider
AHT	Animal Health Technician
APO	Animal Production Officer
AU/IBAR	African Union/Interafrican Bureau for Animal Resources
BRACED	Building Resilience to Climate Extremes and Disasters Program
C&D	Italian Institute for International Cooperation and Development
CAHW	Community Animal Health Worker
CAHWA	Community Animal Health Workers Association
CBPP	Contagious bovine pleuropneumonia
CCPP	Contagious caprine pleuropneumonia
CLIDE	The Community Livestock-Integrated Development Consultancy
CVM	Christian Veterinary Mission
DADI	District Assistant Drug Inspector
DADO	Dodoto Agro-Pastoralist Development Organization
DDC	Division of Disease Control
DLHE	Department of Livestock Health and Entomology
DLWG	District Livestock Working Group
DOCAHWA	Dodoto Community Animal Health Workers Association
DPO	District Production Officer
DVO	District Veterinary Office(r)
DVS	District Veterinary Service
ECF	East Coast fever
EMA	Event Mobile Application
EMPRES-i	Global Animal Disease Information System
EVK	Ethnoveterinary Knowledge
FAO	Food and Agriculture Organization
FARM Africa	Food and Agricultural Research Management for Africa
FGD	Focus Group Discussion
FMD	Foot and mouth disease
GHG	Growth, Health, and Governance
GIRL	Girls Improving Resilience with Livestock
JICAHWA	Jie Community Animal Health Workers Association
KIDDP	Karamoja Integrated Disarmament and Development Programme
KLDF	Karamoja Livestock Development Forum
KRSU	Karamoja Resilience Support Unit
LHM	Livestock Health and Marketing

LSD	Lumpy skin disease
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries
MOF	Ministry of Finance
MSFS	Market Systems and Financial Services
NADDEC	National Animal Disease Diagnostics and Epidemiology Centre
NDA	National Drug Authority
NGOs	Non-governmental Organizations
NSCCS	Nadunget Saving and Credit Cooperative Society Limited
OIE	Office International des Epizooties
P/APFS	Pastoral/Agro-pastoral Field Schools
PARC	Pan African Rinderpest Campaign
PAVENET	Pastoral Veterinary Systems Network
PCAHWA	Pokot Community Animal Health Workers Association
PFS	Pastoral Field School
PPR	peste des petits ruminants
PSRP	Public Service Reform Program
PVP	Private Veterinary Pharmacy
SAP	Structural Adjustment Program
TAD	Transboundary Animal Disease
TBD	Tick-borne Disease
ToT	Training of Trainers
UBOS	Uganda Bureau of Statistics
UPDF	Uganda People's Defence Force
UVA	Uganda Veterinary Association
UVB	Uganda Veterinary Board
VLU	Veterinary Livestock Unit
VO	Veterinary Officer
VPP	Veterinary Paraprofessional
VSF-B	Vétérinaires sans Frontières Belgium

EXECUTIVE SUMMARY

BACKGROUND

The Karamoja sub-region in northern Uganda is characterized by agropastoralist and pastoralist livelihood systems, with a reliance on livestock for human food and nutrition, income, and social capital. Livestock disease is a major constraint to livelihoods in Karamoja and causes death of animals. Disease also has important impacts on milk supply and the availability of animals for sale.

In common with other African countries, Uganda experienced structural adjustment programs (SAPs) starting in the 1970s, leading to attempts to liberalize and privatize veterinary services. The importation and distribution of veterinary medicines were assigned to the private sector as was the provision of clinical veterinary care, and government services were downsized. Uganda also implemented national decentralization policies. For veterinary services, this meant that district authorities took on responsibility for various public sector tasks that were previously handled centrally.

Areas such as Karamoja pose particular challenges for the design of veterinary services, because they are relatively remote, have poor infrastructure, and the livestock herds are mobile. This situation increases the cost of conventional service delivery models based on fixed-point facilities and makes the area unattractive for veterinary professionals. At times, Karamoja has also been affected by armed conflict and insecurity. Overall, veterinary privatization based on typical veterinary practice models was slow to take off in Karamoja. Together with a decline in government services, this created a situation of very weak service provision during the 1980s.

In the early 1990s, community-based animal health workers (CAHWs) were introduced to Karamoja under the Participatory Community-based Vaccination and Animal Health Project of the Organization of African Unity/Interafrican Bureau for Animal Resources¹, in partnership with the Government of Uganda. Soon after, various international NGOs (non-governmental organizations) also supported CAHW projects. A range of different CAHW projects has been implemented over the last 25 years. This review aimed to take stock of these projects, along with veterinary services and livestock disease control in general in Karamoja today.

ANALYTICAL APPROACH

The review used a systems approach, whereby a system is characterized based on its purpose or goal, the components and sub-components required to achieve this purpose, and the interactions and interrelationships between the components and sub-components that exist to facilitate functioning of the system. Therefore, the review:

- Assessed changes in disease impact as an indirect measure of the veterinary service, notably activities related to curative and preventive services;
- Identified the availability, appropriateness, and level of provision of facilitative services such as drugs and vaccine supplies, training, disease surveillance, and diagnostic services;
- Identified service providers and their role and approaches to service delivery;
- Described the interaction and interrelationships between service providers and how this facilitated or constrained the effectiveness and sustainability of veterinary services in the sub-region.

CHANGES IN DISEASE IMPACTS

Livestock diseases are continuing to have major impacts on livelihoods in Karamoja. In particular, the impacts of tick infestation and tick-borne diseases, trypanosomiasis, peste des petits ruminants (PPR), and foot and mouth disease (FMD) were noted as among the most important. In turn, these impacts were attributed to weak and ineffective veterinary service delivery. Weaknesses were evident in all components of the veterinary system, including poor facilitative services, weaknesses associated with the quality and sustainability of service providers, poor interactions between actors, and limited coordination.

FACILITATIVE SERVICES

Quality and quantity of drugs and vaccines: Although the involvement of the private sector in veterinary drug supply has improved substantially during the last two decades, availability and access to a wide range of drugs by livestock owners remain a major challenge. This was associated with the low financial capacity of local drug shops to order bulk stocks from suppliers in Kampala and poor networks among the private actors locally that would improve drug distribution. For larger private facilities, a legal requirement to employ a pharmacist was also a constraint.

¹ Now the African Union/Interafrican Bureau for Animal Resources (AU/IBAR).

There is also a concern about poor-quality or counterfeit drugs circulating in the sub-region. Similarly, vaccines and thus vaccination coverage were far below required levels. The repeated outbreaks of FMD and PPR were associated with limited vaccine supply and questions about the vaccination strategy. Quality issues were reported for PPR and pox vaccines.

Disease surveillance system: There is no systematic disease surveillance system in place to support disease control. Disease control strategies for many diseases appear to be outdated, with control activities taking place haphazardly and as resources appear. Development of strategies appears not to be based on economic and epidemiological analysis of diseases. The introduction of a real-time disease reporting system has improved surveillance, but its contribution to effective disease control is yet to be seen. There are some glitches in the new system associated with bureaucratic issues and approvals by district veterinary officials that are needed to trigger actions such as laboratory diagnosis or control measures. Disease reporting is unlikely to be sustained unless linked to effective disease control responses.

Training of CAHWs: The number of CAHWs trained in Karamoja by various NGOs was estimated at 1,349. Using figures from district veterinary offices, the review estimated that 455 CAHWs were functional in some way. The high dropout was attributed to several factors, but predominantly was due to the poor design and establishment of the system, and limited coordination. NGOs varied in their approaches to training, and in general there was insufficient training on business skills. Trainers of CAHWs lacked knowledge of the participatory training skills needed for effective training.

ANIMAL HEALTH SERVICE PROVIDERS (AHSPs)

Types of animal health service providers: AHSPs in Karamoja include the government, private sector, NGOs, and the livestock owners themselves. Although there is a distinction between central and local government services, the activities include the procurement and distribution of vaccines for transboundary animal diseases (e.g. FMD and PPR), tsetse control, and coordination. Private sector actors include veterinarians, animal husbandry officers (AHOs), animal health technicians (AHTs), CAHWs working individually or as associations, traditional healers/medicines, and untrained “backpack” traders. All of these actors were involved in dispensing veterinary drugs, but with differences in the range, quality, and quantity of products they offer. The role of the private sector in vaccination and vector control was very limited. Veterinary services rely heavily on NGOs and FAO, who support both government and private actors and often provide direct support to livestock owners. Veterinary activities vary

between NGOs, but the common activities related to training of CAHWs, purchase and supply of drug and vaccines, and funding of vaccination campaigns (FAO).

Distribution of AHSPs: Analysis of the distribution of veterinary staffing levels, including CAHWs, revealed that there is no shortage of staff at present. An analysis of the Veterinary Livestock Units (VLUs) required for preventive and curative services, with and without CAHWs, clearly showed the potential for CAHWs to contribute enhanced access to preventive and curative services.

Effectiveness and sustainability of AHSPs: The effectiveness of different AHSPs was assessed against five indicators, viz. accessibility, availability, affordability, acceptability, and quality.

CAHWs were rated as the most accessible AHSP, following traditional medicine. They were also the most acceptable and trusted AHSP, but there were concerns about the availability and quality of services provided by CAHWs. Low availability was explained by the low stocks of drugs handled by CAHWs. The quality of CAHW services related to their training, which was often insufficient in terms of practical or participative training techniques. Also, they did not receive frequent refresher training or adequate on-the-job support and supervision from veterinarians. The affordability of AHSPs was mixed and related to the quality of drugs. Although traditional medicine and backpack drug suppliers were the most affordable, CAHWs and drug shops were recognized as providing better-quality medicines, with reasonable affordability.

Veterinary drug shops scored high in availability compared to other AHSPs, mainly because of their relatively good drug stocks and their long opening hours. In terms of quality, all drug shops were rated as supplying good-quality drugs, but they varied in terms of any additional services provided, such as advice on drug usage and handling. Similarly, in terms of recovery of sick animals after treatment, veterinary pharmacies owned and managed by veterinarians and AHOs (Animal Husbandry Officers) were favored. However, drug shops were less accessible, affordable, and acceptable than CAHWs.

Government veterinary services were rated as the least accessible and available service provider. The service provided was limited to vaccination and tsetse control, but these were viewed as insufficient and inconsistent, explaining their poor accessibility and availability ratings. Government veterinarians were rated high for quality of service due to the advice they offered. However, vaccination was seen as low quality due to repeated disease outbreaks and insufficient coverage.

NETWORKING, LINKAGES, AND COORDINATION

No single actor is responsible for all aspects of veterinary service provision, and so clear linkages and collaboration between actors are important. However, there was no satisfactory interaction and coordination among actors. Some of the indicators of poor coordination and interaction included the breakdown of disease reporting and delayed responses, clustered distribution of CAHWs across geographical areas, a lack of minimum standards and guidelines for design and establishment of a CAHWs program, and various examples of duplication and overlaps of interventions.

POLICY FRAMEWORK

Although privatization and decentralization policies are seen by government as supporting better veterinary services, the proper implementation of policies constrains service delivery. For the private sector, a key concern was the inability to enforce measures to control illegal actors. Second, although CAHWs were recognized informally, some of the restrictions in the existing legislation pose a threat and create uncertainties around the sustainability of the system. The decentralization of veterinary services has overlooked the need for central control of Transboundary Animal Diseases (TADs), which must be coordinated across Uganda and neighboring countries.

CONCLUSION AND RECOMMENDATIONS

The review concludes that veterinary service delivery in Karamoja faces multiple and complex challenges and constraints. These include insufficient and inconsistent veterinary drug and vaccine supplies, weak disease control strategies and interventions with limited economic or epidemiological grounding, and poor enforcement of privatization policies and regulations. There was also limited capacity within government to regulate and supervise CAHWs, and ensure the quality and sustainability of the services they provide. This relates to the absence of a generic, evidence-based, and standard approach and guideline for the design and establishment of CAHWs projects. The review makes the following key recommendations:

- Introduce appropriate coordination mechanisms at district level, which in turn are linked to a Karamoja Livestock Development Forum at sub-regional and national levels.
- Involve private veterinary service providers in the design and establishment of CAHW projects from the outset, to establish linkages for drug supply and supervision. Support overall quality assurance by government veterinarians.
- Develop and enforce Minimum Standards and Guidelines for the Design and Establishment of a Sustainable Community-based Animal Health Service in Karamoja sub-region, endorsed and enforced by a statutory body.
- Develop and enforce a training of trainers (ToT) manual for the training of CAHWs, focusing on the use of participative and practical training techniques. Trainers need to be first trained.

I. INTRODUCTION

I.1 BACKGROUND AND OBJECTIVE OF THE REVIEW

Animal health service delivery in Africa during the colonial and post-colonial periods was largely the responsibility of the public sector. However, over the past 40 years or so, public veterinary services have often faced severe budgetary constraints, leading to declines in service provision (Cheneau et al., 2004). Coupled with a push from the international donor community, governments were forced to implement structural adjustment programs (SAPs). In the case of veterinary services, this involved liberalization and privatization in an attempt to improve service delivery. However, in many pastoralist areas, veterinary services continued to decline, with poor performance by public and private sectors, combined with confusion over roles and responsibilities. Alternative approaches appeared in the late 1980s, notably the use of community animal health workers (CAHWs) supported mainly by NGOs in various pastoral areas of East Africa.

Likewise, in Karamoja there is a long history of veterinary projects involved in different aspect of service delivery, including support to community-based approaches and the supply of medicines through the private sector (Catley, 1997). The effectiveness of the CAHW approach in reducing the impact of livestock diseases was known in Karamoja in the early years following its introduction (Catley, 1997). However, the progress over the years has not been well documented, and there are concerns about the effectiveness and sustainability of current approaches to veterinary service delivery in the region. With changes in policies and legislation, and an increasing number and diversity of service providers, there are also concerns about the coordination of approaches.

This aim of this report is to document the experiences of veterinary service delivery in Karamoja and draw lessons to guide a strategy for future service provision, aligned to Uganda's animal health policies and legislation. A review of the history of veterinary services in Uganda in general was used as a starting point to understand the context for an analysis of the present state of service delivery and to make suggestions for improvement in Karamoja.

I.2 OBJECTIVES OF THE REVIEW

The specific objectives of the review were as follows:

1. Produce a detailed timeline of approaches to veterinary service delivery in Karamoja from the 1970s to the present day. Include changes in Government of Uganda policy and legislation, and summarize the main actors and activities at different times.
2. Document the current approaches to veterinary services being supported in Karamoja and map out the work and approach of each actor/agency, including private sector involvement.
3. Document the views and perspectives of stakeholders in term of options for strengthening clinical veterinary service delivery, with the reasoning behind these views.

The information above will be used to produce recommendations for strengthening veterinary services in Karamoja.

I.3 ANALYTICAL APPROACH

The review was based on a systems approach. A system comprises various key components, and the effectiveness of the systems partly depends on the relationships and connections among these components. The use of a systems approach of analysis involves: (1) defining what the system intends to achieve or how it intends to function; (2) identifying the major components and sub-components that are required to achieve the purpose or function defined in point number 1; and (3) identifying interactions and interrelationships between the components and sub-components that will deliver the intended purpose or function (Bawden, 2006).

The term “system” in relation to animal health services can be described as “The way in which knowledge, skills and other resources related to animal health are organised within an economy for the delivery of services to animals and their keepers” (Mlangwa and Kisauzi, 1994). An animal health service system is composed of a set of sub-systems linked together to reduce the impact of disease and so improve the production, productivity, and welfare of livestock, and the livelihood of the producer.

Mlangwa and Kisauzi (1994) describe the system characteristics of animal health delivery using three main components as follows:²

- *Functional component*—includes curative services, preventive services, promotional or extension, and veterinary public health services;

² Other literature classified veterinary service in three categories: curative services, preventive production of veterinary pharmaceuticals, and human health protection (de Haan and Umali, 1992).

I. INTRODUCTION

- *Facilitative component*—includes training and research, resources (finance), diagnostic, and veterinary inputs production and supply;
- *Service provider component*—includes the public and/or private sector providing one or multiple services.

With these three components in mind, the review of animal health services in Karamoja was guided by the analytical framework illustrated in Figure 1.

Based on this framework, the following key questions were used during the review:

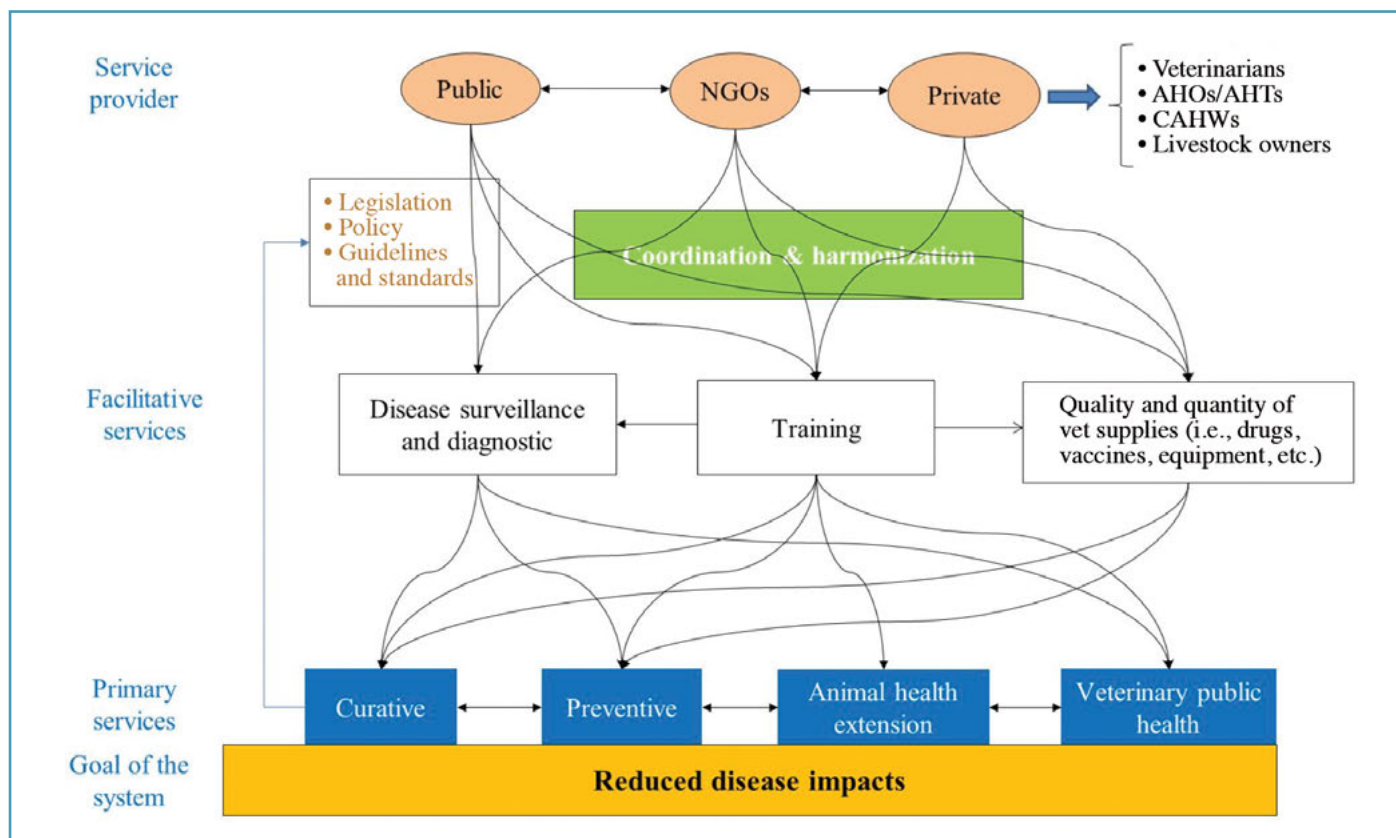
- What veterinary services were available, mainly focusing on curative and preventive services? Curative services cover the diagnosis and treatment of diseases, and preventive services cover actions used to stop disease occurrence, e.g. through immunization of animals with vaccines, eradication or control of vectors (such as ticks and tsetse flies), and other disease control measures such as quarantines, slaughtering, and movement restrictions.

- What facilitative services are available, including their appropriateness and level of provision? This includes primarily drugs and vaccine supplies, training, disease surveillance, and diagnostic services.
- Who were the service providers, what aspect of veterinary service are they supporting, and what approach was used to deliver veterinary services?

I.4 DATA COLLECTION METHODS

The review was based on data collected from all seven districts of Karamoja sub-region. Various methods such as focus group discussions (FGDs) at *kraal* level, key informant interviews, participant observation, and workshops were used to collect the information; the detailed methods are described in Annex 1. Other informants included 61 people from government, NGOs, CAHWs, regulatory bodies, and other individuals involved in animal health-related issues located in Karamoja and Kampala (see Annex 9).

Figure 1. Analytical framework used for analysis of veterinary service delivery in Karamoja



2. THE EVOLUTION OF ANIMAL HEALTH SERVICE DELIVERY IN KARAMOJA

2.1 THE COLONIAL ERA: RELIANCE ON ETHNOVETERINARY KNOWLEDGE

The veterinary services in Uganda started in the early 1900s, using foreign veterinary officers of the colonial administration. The main aim of the service was to deal with epidemic diseases, and control bovine pleuropneumonia (CBPP) and rinderpest, largely through stringent movement control. The provision of clinical services was limited to commercial farms owned by white settlers. The absence of clinical services indicates that during this period, herders were relying heavily on their indigenous knowledge and skills, or “ethnoveterinary knowledge (EVK)” as described by NGOs some years later and passed on from one generation to the next (e.g. Grade et al., 2009a; 2009b). In general, the colonial administration alienated Karamoja from the rest of Uganda and considered the region to be harsh, with high human and economic costs of administration (Nsibambi, 2014). The region was marginalized and excluded from social and economic development. The colonial administration closed the borders and used a permit system to restrict movement of traders and visitors.

2.2 POST-INDEPENDENCE VETERINARY SERVICES

Veterinary services in Karamoja received greater attention from government after independence in 1962. A timeline of key events and changes affecting veterinary service delivery and associated policy, legislation, and administrative structure in Uganda in general is provided in Annex 2, and indicates four main periods of development and change: 1962 to 1971; 1971 to 1987; 1987 to early 1990s; and from early 1990s to present day (post-privatization).

1962 to 1971: Strong government veterinary services, free of charge

The first decade following independence is recalled by government veterinary officers today as a period of good veterinary service delivery. In this period, government veterinary services were engaged in delivery of the full range of veterinary activities, greatly expanding the service from colonial period through mass vaccination campaigns and tick control. The services were provided free of charge. The development of the livestock sub-sector received a lot of interest from government in the years following independence, resulting in heavy investment in the construction of vaccination crushes and cattle dips. Although vaccination and vector control programs required heavy recurrent expenditure, the government was able to cover the costs from the national budget (Kasirye, 1998). According to government veterinary officers, the public veterinary service delivery then was highly effective

and well-funded, and various reports support this account. Veterinary services included the introduction of a large-scale compulsory tick control scheme in 1964, which resulted in the spraying of 44,000 cattle in 97 spraying centers, free of charge (Otim, 2000). Also, the government introduced a statutory instrument in 1968 enforcing the compulsory tick control program. Subsequently, the number of dipping/spraying facilities increased, which in turn increased the proportion of cattle dipped or sprayed from 30 percent in 1969 to 50 percent in 1970 (Otim, 2000).

The Karamoja sub-region received other preventive veterinary services, although not as frequently or at as large a scale as other sub-regions of Uganda. During this review, herders in Kaabong recalled aerial spraying against tsetse flies, mass tick control by dipping, and mass vaccination campaigns against CBPP during the regime of Abote 1, with all services provided free of charge.

1971 to 1987: Political turmoil and socio-economic crisis

Between 1971 to 1987, public veterinary services started to decline because of the worsening economic condition in the country, associated with continuous political turmoil and unrest. This period has an important place in the modern history of Uganda, with many thousands of people killed during the power struggle between Amin and Oboete. The Asian community had been critical to Uganda's market economy, and their expulsion by Amin was associated with a marked downturn in the national economy. The poor economic condition left public veterinary services with insufficient operating funds, and mass tick control programs and other veterinary services were disrupted (Okello-Onen et al., 1998). After Amin was ousted from power in 1985, and despite relative peace, veterinary services continued to deteriorate, causing “major animal diseases to become rampant” (Kasirye, 1998).

1987 to early 1990s: Structural adjustment

Increasing fiscal constraints and inefficiency of the public service forced the Government of Uganda to undertake economic and structural reforms in the late 1980s. From 1987, the government veterinary service in Uganda was subject to structural reforms, which included the liberalization of veterinary drug and vaccine imports, distribution, and marketing importation (enacted by the National Drug Policy and Authority Statute Act in 1997), and the privatization of veterinary service delivery. As a result, the delivery of clinical services, importation and distribution of veterinary drugs and other supplies, aspects of livestock production such as artificial insemination, and

tick control were all designated as responsibilities of the private sector. The government retained responsibility for developing policy, national strategies, setting standards and regulations, and inspection and coordination. The public sector was also responsible for disease surveillance and control. Similar reforms were adopted by several developing countries during the 1980s in response to government inability to deliver efficient services (de Haan and Umali, 1992; Mlangwa and Kisauzi, 1994b; Leonard et al., 1999; Lopez et al., 2004; Silkin, 2005).

In order to support the liberalization and privatization policy of veterinary services, National Drug Policy and Authority Statute 1993 was enacted, with the establishment of the National Drug Authority (NDA) at the same time to oversee the implementation of the policy. The mandate of the NDA included regulating the manufacture, importation, and registration of veterinary drugs and vaccines on behalf of the government. The responsibility of the NDA also extended to districts, including the monitoring and inspection of drug and vaccine distribution, and the handling and quality of the drugs and vaccinations by District Assistant Drug Inspectors (DADIs). The importation and distribution of veterinary drugs, vaccines, and other supplies by the private sector were carried out under license from the NDA. The Act did not allow veterinarians to operate veterinary pharmacies and did not recognize veterinary paraprofessionals. To address this gap, the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) drafted a new veterinary drugs policy in 2001, which was seen as contributing to the Act. It assisted in promoting private practice by giving veterinarians the authority to store and sell veterinary medicines.

In common with the shift towards decentralized government in Uganda generally, public veterinary services were devolved centrally from MAAIF to District Veterinary Offices (DVOs) following the Decentralisation Statute No. 15 of 1995, Constitution of 1995 and Local Governments Act of 1997. Accordingly, the responsibility for disease control was fully passed to the DVOs, while the central MAAIF was mandated to formulate policy, provide technical guidance, support disease control in the districts, and handle planning and regulatory functions.

Along with the privatization and decentralization policy, the government launched a Public Service Reform Program (PSRP) in 1997 with the aim of rationalizing and streamlining the roles and responsibilities of government institutions, eliminating redundant staff, and restructuring management systems for improved performance in public service delivery. The implication of the PSRP on public

veterinary services was that veterinarians became the only professionals to remain employable by government, and veterinary paraprofessionals were removed as a category of government staff. As a result, several thousand Animal Husbandry Officers (AHOs) became redundant. However, neither the public nor private sector was able to provide adequate veterinary services in Karamoja. Although the districts had the mandate to recruit all public servants in line with the Decentralisation and Local Governance Act, progress was slow in Karamoja due to weak administrative and institutional capacities, coupled with a lack of infrastructure needed to attract and retain veterinarians. Although the private sector had responsibility for clinical services, former government-employed AHOs and private drug suppliers did fill the gap in service delivery as government withdrew and created a vacuum in services. As described below, the gap was partly filled by the emergence of community-based approaches.

2.3 EARLY 1990S ONWARDS: COMMUNITY-BASED ANIMAL HEALTH WORKER SYSTEMS

In common with other remote and marginalized pastoralist areas of Africa (De Haan and Bekure 1991; Catley et al., 2004), Community-Based Animal Health Workers (CAHWs) have become an important alternative for animal health delivery in Karamoja. Although CAHWs are often associated with NGOs, the first CAHWs in Karamoja were trained in the early 1990s by the government, with support from the Pan African Rinderpest Campaign coordinated by the Organization of African Unity/Interafrican Bureau for Animal Resources (Leyland, 1997).³ Soon after, several NGOs supported CAHWs, including attempts to improve drug supply. A chronology of CAHW training in Karamoja is provided in Annex 3.

As indicated above, the emergence of CAHWs in Karamoja coincided with the liberalization and privatization of veterinary drugs, vaccines, and other supplies nationally starting in 1993. However, most privatization initiatives were limited to Kampala and other larger cities, and did not extend to more remote areas such as Karamoja, for several reasons. There was an assumption that there would be low economic returns from the private provision of veterinary services in remote pastoral areas. These areas were associated with lack of infrastructure, extensive livestock production systems involving mobility, a limited local cash economy, and a heavy reliance by pastoralists on traditional means of disease control and prevention. In addition, conflict and socio-political instability has made the Karamoja sub-region unattractive to the private sector, particularly to veterinarians and large

³ Specifically, CAHWs were trained by the Participatory Community-based Vaccination and Animal Health Project (PARC-VAC), implemented by Tufts University with funding from the US Office for Foreign Disaster Assistance.

companies involved in drug importation or wholesale distribution. Different CAHW projects addressed the problem of drug supply in different ways, but many provided CAHWs with a starter kit of drugs following training. Some supported the establishment of drug shops owned and managed by CAHW associations.

Regardless of their crucial role filling the gap in clinical services, and in common with other countries, CAHWs and NGOs faced criticism and rejection by the veterinary profession in Uganda. In part, negative attitudes towards CAHWs relate to a view that conventional veterinary services are feasible in Karamoja, despite the local socio-cultural and ecological contexts. Over time, policy dialogue among stakeholders helped to contextualize veterinary service delivery in remote pastoral areas. For example, a workshop on “Animal Health Delivery in Pastoral Areas” in 2001 organized by the Department of Veterinary Medicine of Makerere University brought together academics, the Uganda Veterinary Association (UVA), the Uganda Veterinary Board (UVB), MAAIF, NGOs, private practitioners, and others. It concluded that, “CAHWs are needed in Karamoja and other pastoralist areas, subject to review” (Anon., 2001). Similarly, the Vice President of the UVA reported on the UVA Annual General Meeting of 2002, concluding that the “UVA recognizes the work of CAHWs as a major force in supplementing veterinary service delivery in Uganda” (Isabirye, 2003). Although this reflects professional acceptance of CAHWs and a level of recognition by the UVA and UVB at the time, legislation did not recognize CAHWs. The situation has not changed. Today, the absence of CAHW recognition in the Veterinary Surgeon’s Act and the National Drug Statute implies that CAHWs are tolerated but not legal.

⁶ See “Livestock Emergency Guidelines and Standards,” <http://www.livestock-emergency.net/> (accessed October 12, 2015).

3. CURRENT VETERINARY SERVICES IN KARAMOJA

3.1 LIVESTOCK POPULATION AND DISEASE TRENDS

According to official statistics in 2008, the total livestock population in Karamoja was estimated at 5.9 million (Table 1). However, more recent estimates in 2014 report far lower numbers of animals. FAO Uganda used local government statistical abstracts of 2012/2013 and reported only 711,137 cattle, 821,041 goats, and 842,157 of sheep (FAO, 2014), for a total of 2.4 million animals. These figures indicate a fall in population amounting to 75 percent for cattle, 68 percent for goats, and 65 percent for sheep. Likewise, the estimates made by each district in 2012/2013 are substantially lower than the 2008 livestock population census (MAAIF/UBOS, 2008).

Irrespective of census methods and findings, there was consensus across all informants during this review that the livestock population in Karamoja has shown a declining trend in the recent years. Many informants attributed this decline to the constraints imposed on traditional livestock management by the protected *kraal* system associated with the disarmament campaign. In arid and semi-arid grazing systems, livestock mobility is an integral part of the production system and enables herds to access the best rangeland and consume the most nutritious plants. Due to the heterogeneity of soil types and rainfall across space and time, the type and phenology of forage species are also heterogeneous in space and time. Therefore, livestock must move and maximize intake before the plants die off or lose their nutritional value. The protected *kraal* system or any other factors that limit livestock movement reduces access to quality and quantity of forage, which reduces

production. According to livestock owners, the impact of the protected *kraal* system on livestock health was twofold. First, they were less able to attend closely to their animals and deal with disease. Second, high concentrations of livestock in one place for an extended period led to high levels of tick infestation and associated disease risks (see section 3.3 on changes in disease impact). These observations are consistent with a study reporting increasing incidences of East Coast fever (ECF), peste des petits ruminants (PPR), CBPP, and mange, associated with the protected *kraals* (MacOpiyo, 2011). It is well known that pastoralists use mobility not only to access variable pasture and water but also to avoid certain diseases and disease vectors. Although the protected *kraal* system has now been abandoned, livestock productivity is perceived to have remained low, mainly because of weak animal health services.

3.2 VETERINARY SERVICE COVERAGE

As noted above, veterinary services enhance livestock production by reducing mortality and production losses, and improving animal performance. Given this, an important question is the coverage of veterinary services. One way of measuring coverage is to assess the level of clinical service and vaccination relative to livestock populations and numbers of animals at risk of disease, by species and disease. However, these data were not readily available. During the last three to four years, FAO and NGOs have supported vaccination campaigns through government veterinary services, but records of number of animals vaccinated were very inconsistent and not available in some districts. Although drug shops were provided with

Table 1. Livestock population in Karamoja

Districts	Cattle	Goats	Sheep	Total
Kaabong	518,465	525,389	424,729	1,468,583
Kotido	694,247	535,138	555,688	1,785,073
Moroto plus Napak ¹	352,867	380,172	307,028	1,040,067
Nakapiripirit plus Amudat ²	674,746	547,365	389,676	1,611,787
Abim	13,635	37,229	8,381	59,245
Total	2,253,960	2,025,293	1,685,502	5,964,755

¹ Napak and Morot were one district in 2008.

² Amudat and Nakapiripirit were one district in 2008.

(Source: MAAIF/UBOS, 2009)

customer registration forms to record the types of drug distributed and other details, the information was very incomplete and difficult to analyze. Likewise, FAO and Mercy Corps introduced a form for recording treatments or drugs used by CAHWs, but there was no consolidated or completed record available. Therefore, measuring service delivery coverage in terms of the proportion of animals treated and/or vaccinated was not possible, and so services were assessed by reference to changes in disease impact, and by identifying service providers and assessing their distribution and effectiveness.

3.3 CHANGES IN DISEASE IMPACTS

One way to conceptualize effective and sustainable veterinary services is to assume that where a veterinary service delivery is strong, the impacts of diseases are low. Therefore, measuring changes in disease impact can be used as an approximate measure of the strength of the service. Unfortunately, measuring the impacts of disease on livestock is very complex given the differential impacts of diseases as well as the uncertainties about the level of impact that can be expected from different preventive or clinical measures (Leyland et al., 2014). In part, these problems can be handled by using generic impact indicators that encompass all the major impacts of diseases at herd level, by livestock species. These impacts include changes in livestock mortality, production losses

(particularly loss of milk production and body condition), and herd growth. Leyland et al. (2014) used this approach in their analysis of the impact of CAHW programs on disease impacts in Ethiopia, Kenya, and South Sudan. For diseases perceived by livestock keepers as having increasing or decreasing impacts, further in-depth probing questions were used to identify and understand the reasons. In all cases, diseases are first identified based on local naming and description (see Annex 4). Changes in disease impacts were then measured using a simple scoring method.

During the review, disease impact scoring was used in four sites, with communities identifying up to 14 important cattle diseases (Figure 2) and 8 important diseases in sheep and goats (Figure 3). The results indicate that the impacts of these diseases were often high, implying a gap in the effectiveness of veterinary services. These results are consistent with other information collected during the review, such as community perceptions of the effectiveness and sustainability of the different veterinary service providers (see section 3.6). Furthermore, informants involved in FGDs or individual interviews attributed the high disease impact to poor veterinary services. However, different actors suggested specific reasons for different diseases impacts and the associated curative or preventive measures. Some diseases that were seen as especially problematic in Karamoja during the review are discussed below.

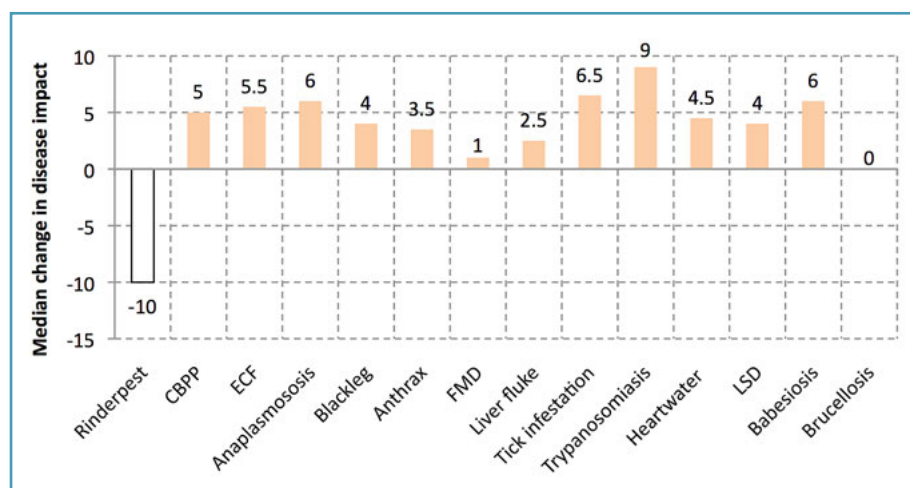


Figure 2. Changes in impact of cattle diseases

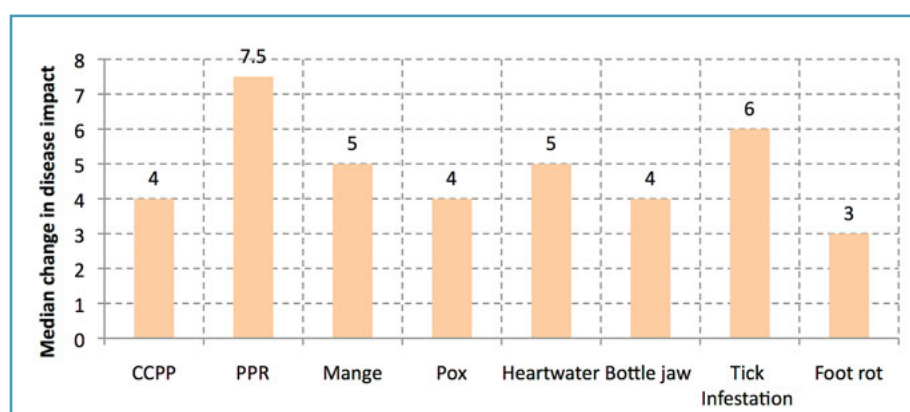


Figure 3. Changes in impact of sheep and goat diseases

3.3.1 Trypanosomiasis

Focus group informants in Kaabong, Kotido, and Amudat attributed an increased impact of trypanosomiasis with the wider geographical distribution of tsetse flies or increased access to tsetse-infested grazing areas, ones that were previously inaccessible because of conflict. In Kaabong, livestock owners explained that in the past, tsetse flies were found mainly in Kidepo National Park, and only cattle in the bordering sub-county (Kapedo) were affected. Recently, tsetse flies have spread across the region, associated with increased wildlife movement outside the park, and near to several *kraals* in various sub-counties in Kaabong and Kotido Districts. Herders noted that in the past, wildlife was restricted to the park because of shooting by herders of any wildlife that strayed outside the park. Since disarmament, however, wildlife has been able to move extensively. Participatory mapping of wildlife movements revealed areas along which tsetse flies may have spread to cattle *kraals* in various sub-counties and in Kotido District (see Annex 5). A further consideration is that one species of trypanosome, *Trypanosoma vivax*, can be spread by biting flies other than tsetse flies. Tabanid flies in particular can transmit this parasite outside of tsetse zones, further complicating the epidemiology of the disease.

Focus group informants in Amudat describe the challenge posed by tsetse flies and trypanosomiasis as a recent phenomenon, which started during the last three years. According to livestock owners, *lokosogwa* (“the new fly”), referring to tsetse flies, had been found mainly around the Kanyangareng River. At present, however, the fly is found in areas away from the river. In addition, the grazing areas along the river were not accessed in the past because of conflict, but after disarmament there has been increased access to this grazing area and so increased exposure to tsetse flies.

A recent study estimated the point prevalence of trypanosomes in cattle and donkeys, based on 2,030 samples from cattle and 71 samples from donkeys in Kaabong, Kotido, Amudat, and Nakapiripirit Districts (Muhanguzi et al., 2016). In cattle, 17.1 percent tested positive for one of the three trypanosome species, viz. *T. vivax*, *T. congolense*, or *T. brucei*, with *T. vivax* accounting for nearly 70 percent of cases. The herd prevalence of trypanosomes was 85.7 percent.

3.3.2 Tick infestation and tick-borne diseases (TBDs)

The impact of tick infestation and tick-borne diseases (TBDs), notably anaplasmosis, babesiosis, heartwater, and ECF, were reported to have increased. Recent studies report community perceptions of increased tick infestation and high prevalence of TBD in cattle (Bayaruhanga, Collins et al., 2015; Bayaruhanga, Oosthuizen et al., 2015; Lolli et al., 2016) and goats and sheep (Lolli et al., 2016). Livestock owners and veterinary professionals interviewed during this review offered various explanations for the

increased impact of TBDs but commonly referred to the breakdown of dipping and spraying by government veterinary services before privatization. Unfortunately, very little data are available on the prevalence of TBDs in Karamoja before privatization, or the effectiveness of the dips or sprays used by government services.

As in the case of tsetse fly contacts and trypanosomiasis, the increased use of common grazing areas between cattle and wildlife may have increased cattle exposure to ticks and TBD, because wildlife (particularly buffalo) act as a reservoir for many tick-borne pathogens (Oura et al., 2011). It seems that livestock owners stated that they used acaricide, but with limited knowledge on correct use, e.g. they practiced inappropriate dilution or infrequency of application (which should be seasonal).

Interviews with herders during the review indicated irregular spraying, ranging from none to three times a year, depending on the tick burden, and focusing on selected animals rather than the whole herd. Although herders were aware of the seasonality of tick burdens, with higher infestation during the wet season, the use of spray by some herders was not seasonal. An investigation of factors constraining sustainability of tick and TBD control in Uganda generally identified malpractice associated with acaricide use. The malpractice involved delivery, choice, dilution rates, methods, frequency of application, storage, and disposal (Okello-Onen et al., 2003).

The restricted movement of livestock and cessation of grass burning may have also contributed to increased tick infestation and associated diseases. Herders noted the seasonal burning of bush used to help in controlling tick populations. In Kaabong, herders mentioned burning was one of the strategies used to control ticks in the past, but this was later prohibited by the Burning of Grass Act (Chapter 33), introduced in 1974. While the Act makes exceptions, such as the clearing of land for farming and making a firebreak for protecting life or property, it does not take account of the needs of the pastoralists. Herders also noted the restriction of livestock movements during the disarmament program, when livestock were kept in protected *kraals*, and how this contributed to increased tick burdens. Pastoralists use mobility, among other practices, to avoid tick and other pest infestation.

3.3.3 Transboundary animal diseases

Transboundary animal diseases (TADs) are diseases designated by the World Organization for Animal Health (*Office international des épizooties (OIE)*) as being of major economic importance nationally and in terms of international trade and the risks of disease spread between countries and regions. Although a number of TADs in Karamoja have been subject to vaccination programs, the review indicated that these diseases still had substantial negative impacts in the region, e.g. FMD, CBPP, and PPR.

It was beyond the scope of the review to examine disease control strategies in detail, but a concern was that vaccinations were carried out in response to disease outbreaks or as resources allowed, rather than as a well-designed preventive measure that uses epidemiological information, such as the seasonality of disease risks. Vaccination in response to outbreaks has at least two important limitations. First, by the time vaccination takes place it is likely that substantial losses have already occurred. Second, when there is a delay in vaccination relative to the start of the outbreak, it is possible that the outbreak is already declining naturally by the time vaccination takes place. This can give the impression that vaccination is stopping the outbreak, which is not necessarily the case. A further consideration is that, by definition, TADs can spread between countries and so need regional and cross-border strategies and coordination for effective control.

Foot and mouth disease

The FMD vaccination record from Kotido District shows a vaccination campaign carried out from November to December 2014, which was interrupted by limited funding and not resumed until March to November 2015. Even then, the overall coverage was reported as insufficient. During this review, an FMD outbreak was reported in Moroto and Amudat. The DVO of Nakapiripirit described the problem as follows:

The outbreak first occurred in Kween in Kapchorwa District bordering Karamoja in the southeast, and was introduced into Amudat District. As soon as the outbreak report was received from CAHWs, the Nakapiripirit District veterinary service mobilized resources from stakeholders. FAO provided the vaccine, an NGO paid CAHWs per diem, and government covered the remaining logistics such as a vehicle for the team, camping equipment, and per diem for its own staff. Then, the team carried out a campaign in June and July 2016, vaccinating more than 15,000 cattle along the border between Amudat and Nakapiripirit, based on the concept of buffer vaccination to prevent the spread of the disease into the district. The vaccination was successful in preventing spread to Nakapiripirit, but the fact that a similar measure was not taken in Amudat, [meant] the disease did not only affect cattle in the district, but it has also spread to Moroto.

A discussion with the Moroto District veterinary office team revealed that they were aware of the FMD outbreak reported by CAHWs, but at the time they did not have resources to respond. Unfortunately, FMD outbreaks lead not only to direct impacts for herders in terms of losses in milk production, but also market impacts because of market closures and other government-imposed restrictions. These measures are reported to have serious economic effects on livestock keepers but, along with vaccination, seem to have

achieved limited, if any, impact on FMD control. According to the timeline in Annex 2, FMD outbreaks were recorded between 2013 and 2016 in Karamoja despite vaccination. Similarly, observations of an FMD outbreak shortly after a vaccination campaign in Teso sub-region in 2010 attributed the outbreak to poor coverage because of vaccine shortage (Ilukor et al., 2015).

Peste des petits ruminants

Other important TADs are CBPP, contagious caprine pleuropneumonia (CCPP), and PPR. In theory, these diseases are more easily controlled by vaccination relative to FMD due to various epidemiological and vaccine issues. PPR was regarded as a relatively new disease in the region, and one having high impact (possibly because it is a new disease). Although the first suspected PPR outbreak was reported in 2006 in Karamoja, PPR was not confirmed by MAAIF until July 2007 (Luka et al., 2012). Almost a year after this confirmation, an “emergency” vaccination campaign was carried out from August to October 2008, with support from FAO (MAAIF, 2009). Since then, outbreaks have been persistent despite vaccination to control the disease.

The control of PPR through mass vaccination requires 70 to 80 percent herd immunity to stop virus circulation (Singh, 2011). However, it seems that vaccination coverage in Karamoja has been inadequate, with herd immunity averaging 55.3 percent. In some locations where vaccination took place, it is as low as 20 percent. Vaccination practice in Karamoja at present is carried out haphazardly without epidemiological reasoning. For that matter, currently, the country does not have a PPR vaccination strategy (Luka et al., 2012).

In addition to poor coverage, low herd immunity following vaccination could be due to poor vaccine administration and/or efficacy of the vaccine (Luka et al., 2011). Issues of vaccine efficacy are highly relevant, as the vaccine used in Karamoja was one of the products found to be substandard and recalled by the National Drug Authority in September 2016 (NDA, 2016). The NDA news release stated that “The PPR and Pox combined vaccine (Batch No. 15LPPB003, Manufactured by MCL Santé Animale, Morocco) did not comply with OIE Specifications for potency of PPR.” Large quantities of the vaccine were observed in the Moroto District veterinary service storage. The problem of poor vaccine administration cannot be ruled out and depends on the quality of training and supervision of the CAHWs who supported the vaccination. However, several reviews of the impact of CAHWs on disease control in pastoral areas showed that they were particularly effective in vaccination. For instance, the eradication of rinderpest in Afar, Ethiopia (Admassu, 2003 and South Sudan (Jones et al., 1999) are some of the vaccination campaigns that demonstrate the effectiveness of CAHWs in administering vaccines.

Other diseases

The diseases discussed above were of particular concern to informants during the review. However, as indicated in Figures 2 and 3, various other important livestock diseases are present in Karamoja and include anthrax, blackleg, helminthiasis, fasciolosis, pox diseases, mange, lumpy skin disease, brucellosis, tuberculosis, and rabies.

3.4 FACILITATIVE SERVICES

The limited performance of the curative or preventive veterinary care discussed above depends on several underlying facilitative services, viz. the supply of quality medicines and vaccines, disease surveillance, training and education, and veterinary and diagnostic services.

3.4.1 Supply of medicines and vaccines: Quality and quantity

The quality and quantity of veterinary medicines and vaccines available in Karamoja are major determinants of the quality and coverage of services. Under the NDA, Uganda is reported to have a very good system for ensuring the quality of veterinary products. The veterinary unit of the NDA undertakes various quality assurance activities, including the regular inspection and licensing of premises and facilities dealing with the importation, distribution, and dispensing of veterinary medicines. There are penalties for selling adulterated or misrepresented products. However, less clear is the extent to which products are tested for efficacy before or after importation, e.g. using a random sample of medicines circulating in the market. Although the NDA has established a national pharmaceutical quality control laboratory, the capacity of this facility for testing veterinary medicines and vaccines needs to be examined. The recent recall of PPR vaccine (see above), along with a further six products from the market, raises doubts and questions about the quality assurance system and its capacity to prevent substandard products from being used by service providers or livestock keepers.

Information provided by livestock owners, CAHWs, drug shop owners, and government veterinarians during the review revealed the presence of poor-quality or counterfeit drugs in Karamoja. This was seen as a major problem along the Uganda-Kenya border. Focus group informants and the Pokot Community Animal Health Workers Association (PCHAWA) in Amudat reported that fake drugs were coming from Kenya. These drugs had the same labels and branding as those from Kampala, but when closely observed, the seals or labels were seen to be not genuine. Although drug quality seemed not to be a major concern in other parts of Karamoja, there are several preconditions that encourage the spread of counterfeit drug circulation across the region, including:

- There is very poor access to quality medicines in remote areas of the region.
- Limited supply of quality drugs in drug shops and frequent gaps in supply. Drug importers and distributors based in Kampala are not willing to accept orders of stock worth less than UGX5 million (US\$1,500). The financial capacity of most of the local retailers is very low, and with high transport costs, it is difficult for them to visit Kampala and buy large stocks.
- Weak inspection and enforcement process in Karamoja, although the NDA has excellent quality assurance regulations, overseen locally by District Assistant Drug Inspectors (DADIs). Government and private practitioners, and DADIs, unanimously agreed that the NDA regulations and policies were not enforced, and substantiated their views as follows:
 - Private vet drug shops attribute the flourishing of unqualified and unlicensed retailers to poor implementation of regulations that prohibit such practice.
 - Recognizing the problem, the DADI responsible for inspection and enforcement of regulations provided a range of reasons for failing to do so, including: shortage of manpower (during this review there was one person assigned to cover two districts); extremely low budget allocation; lack of support from local government law enforcement (i.e. the police and judiciary).
 - The DADIs reported that they can identify illegal retailers by name. However, they were not able to stop them from working, because often the police were reluctant to prosecute them. If they were prosecuted, they were often protected by powerful individuals and could soon re-establish themselves.

In terms of the volumes of medicines and vaccines available, there is huge dissatisfaction across all service providers as well as livestock owners. In general, the drug supply system had improved since the introduction of privatization, with the number of drug retailers increasing from none in the early 1990s to 31 in the recent years (VSF-B, 2016). However, the drug shops visited during this review were operating with very low levels of stocks, as illustrated in Figure 4 (see Annex 6 for a list of the drug shops visited). As noted above and also listed in Table 10, low financial capital and high transport costs were among the major constraints that the drugs shops identified as limiting their stock volume.



Figure 4. Examples of drug shops with poor stock (Photo source: Dawit Abebe)

Likewise, vaccine supply was far below the required amounts. Although many important diseases are preventable through vaccination, the high disease impact observed was mainly associated with a shortage of vaccine supply. The central government veterinary service (MAAIF) is responsible for importing and distributing vaccines for all the diseases in question except for Newcastle disease, which falls under private sector. However, all DVOs interviewed firmly reported that they never received the amounts of vaccine requested and that vaccines were not delivered on time. Therefore, the region depends heavily on FAO, and to a lesser extent on NGOs, for vaccine supply and other financial support to deliver vaccination services. Figures on the amount of vaccine requested and received from MAAIF were not available in Karamoja. However, information from Teso sub-region illustrates the problem. In 2010, out of 50,000 units of vaccine required to control an outbreak of FMD, only 10,000 units were available from MAAIF (Ilukor et al., 2015). In addition to adequate vaccine supply, the effectiveness of vaccination services depends on epidemiological knowledge of the disease, diagnostic support, and a vaccination strategy that is technically sound and economically feasible.

3.4.2 Disease surveillance, reporting, and diagnostic services

A disease surveillance system can comprise different activities, depending on the objectives of the system. However, Mariner (2002) suggests four major activities for comprehensive surveillance system: general disease reporting; outbreak detection and investigation; laboratory diagnosis; and targeted surveillance. These activities are discussed in relation to surveillance in Karamoja below.

- **General disease reporting:** In Karamoja, this involves collecting data on animal diseases on a monthly basis using surveillance forms, designed and introduced by NGOs, including:
 - Monthly surveillance data from CAHWs, including recording the service provided and drugs used during the month (i.e. type, volume, source, and pricing).
 - Monthly surveillance data from drug shops, to include:
 - Clinical services such as major diseases treated, number of animals by species affected

by each major disease, number of animals treated by species against those diseases, and the proportion of treated animals surviving and dying;

- *Kraals* and livestock owners visited, and services provided;
- Records of the main drug sold for the current and past reporting month, including the name of the drug, source, pricing, and shelf life.

However, none of these forms were completed by CAHWs or drug shops, or submitted to DVOs.

- **Outbreak detection and investigation activities:**

This involves identifying, reporting, and investigating disease events. Typically, outbreaks of endemic diseases (or the emergence of new diseases) are first identified by livestock owners, who report to CAHWs or drug shops, who in turn pass information to DVOs or NGOs. For example, the emergence of PPR in Karamoja was first identified as an emerging disease by a herder who had lost hundreds of sheep to the disease in Napeet Village, Lopuyo Parish in Rengen sub-county of Kotido District. The livestock owner reported the case to a private service provider, who in turn relayed the report to the Director of Veterinary Services in Entebbe. More recently, the EMPRES-i Event Mobile Application (EMA) system of disease reporting has been launched nationally, supported by FAO. Selected government veterinary staff and CAHWs have been trained in how to use the application and then given a smart phone to report disease events directly from the field by entering epidemiological data, which then enter the Global Animal Disease Information System (EMPRES-i).

- **Laboratory diagnosis:** This involves laboratory confirmation of provisional disease diagnoses derived from clinical and epidemiological information. Laboratory diagnostic services were provided by the Karamoja Regional Veterinary Laboratory (KRVL), established by the Italian Institute for International Cooperation and Development (C&D) in 1999. The laboratory is located within the C&D premises in Moroto and is managed by one veterinarian and one AHO, salaried by C&D and government respectively. At the time of the review, C&D was in the process of handing over the laboratory fully to the Moroto District veterinary services. The main diagnostic tests available included a rapid brucellosis test, serological tests (particularly for TBDs), tests for internal parasites, and a water quality test. The facility also stored serum in a serum bank. The diagnosis of TADs such as FMD, PPR, and CBPP (required to

support vaccination programs) was handled by the laboratory of the National Animal Disease Diagnostics and Epidemiology Centre (NADDEC) in Entebbe.

Although the introduction of the EMPRES-i EMA might speed up the receipt of reports of suspected disease events by NADDEC, the feedback responses, including laboratory confirmation and disease control support, were usually very delayed for at least two reasons. First, all reports had to be endorsed by the DVO of the district concerned for MAAIF to take action. The drawback of this bureaucratic process was observed during the review, whereby NGOs were complaining that a DVO had failed to endorse a report of a suspected FMD outbreak that had long been reported through EMA from the field. Second, even if DVO endorsements occurred on time, limited resources (or the time needed to secure funding) delayed the process of laboratory confirmation.

- **Targeted surveillance:** A surveillance system can aim to detect specific diseases using targeted surveillance. This involves active surveillance and sero-surveillance. Active surveillance can include heightened surveillance and disease searching, whereas sero-surveillance detects antibodies resulting from exposure to disease or past vaccination. There was no evidence of active surveillance activities in Karamoja. Sero-surveillance activities were limited and related to academic research. Although this research was useful, there seemed to be no linkages to processes for revising disease control measures. For example, research involving sero-surveillance to detect PPR antibodies in vaccinated and non-vaccinated herds (Luka et al., 2011; Mulindwa et al., 2011) reported concerns over vaccination coverage, efficiency, and circulation of the virus in non-vaccinated herds. This kind of information is useful to improve vaccination measures and disease control strategy.

3.4.3 Training

Developing human resources through the education and training of veterinarians and paraveterinary professionals, and training of livestock keepers is an important element of an effective and sustainable veterinary service. Following structural adjustment, very few government veterinary staff were employed in Karamoja. The main types of trainings have been: training of CAHWs; training of community members through Pastoral/Agro-Pastoral Field Schools (P/APFS); training of CAHWs and government staff on disease surveillance; awareness-raising workshops with stakeholders; CAHW Training of Trainers (very limited); and business skills and management training.

The training of CAHWs has been the main training activity supported by NGOs, while noting that the first CAHWs were trained by the Uganda government's PARC (Pan African Rinderpest Campaign) project, assisted by OAU/IBAR, in the early 1990s (see section 2.3). Despite a long history of CAHWs training and various ongoing CAHW projects, during the review it was very difficult to get a proper record of the number of CAHWs trained and how many of them were functional. Neither the DVOs nor most of the NGOs could provide the number of CAHWs trained in the region. An attempt to compile information on training is provided in Annex 3. It draws on interviews with CAHWs and a review of evaluation and workshop reports. This points to about 1,349 CAHWs trained in Karamoja over the years by different NGOs. However, an inventory of CAHWs in the region carried out by FAO in 2011 reported the presence of 704 CAHWs in the region, using figures from DVOs; 455 CAHWs were reported to be functional at the time. This implies a high dropout rate of CAHWs. Similarly, a study conducted by VSF-B in Kaabong in 2011 reported that out of 127 CAHWs trained

by Oxfam, only 57 of them were “functional” (MacOpiyo, 2011). According to DVOs, functional CAHWs are those who are involved in vaccination programs, rather than CAHWs who deliver basic clinical services. At the present time, the number of active CAHWs providing clinical services is unknown.

3.5 ANIMAL HEALTH SERVICE PROVIDERS IN KARAMOJA

3.5.1 Types of service providers

The main animal health service providers (AHSPs) involved in different aspects of veterinary service delivery in Karamoja include the government, NGOs, and private sector actors, including the livestock owners themselves. While some AHSPs are engaged in only one aspect of veterinary services, others may be involved in multiple components of veterinary services. The veterinary service provided or supported by key service providers is summarized in Table 2.

Table 2. Veterinary service provided by different service providers

Veterinary activities and responsibilities	Private	Public		NGOs	Livestock owner
		Central	Local		
1. Procurement and distribution of veterinary supplies					
• Vaccines—procurement and distribution					
✓ CBPP, FMD, and PPR		++		+++	
✓ Newcastle	++			+++	
• Veterinary medicines—procurement and distribution					
✓ Antibiotics, anthelmintics, vitamins and minerals	+++			++	
✓ Acaricides					
❖ For tsetse control (Deltamethrin)		+++			
❖ For ticks and other external parasites	+++			++	
2. Service delivery					
• Vaccination activities	++		+++		
• Curative activities (clinical diagnosis and treatment)	++				+++
• Vector control					
✓ Tick control	+				+++
✓ Tsetse control	++		+++		
• Disease surveillance and reporting					
✓ General disease reporting	++		+		+++
✓ Outbreak detection (clinical and epidemiological)	++		++	++	++
✓ Laboratory diagnosis					
❖ Transboundary diseases		+++			
❖ Other diseases			++	+++	
✓ Targeted surveillance (i.e. sero-conversion and sero-prevalence)		+++	+	++	
3. Regulatory services					
• Monitoring and enforcement of drug-related policy		++	+		

Public veterinary service providers

The public animal health actors are divided into central and local levels following the decentralization and privatization acts and policies. At central level, they include MAAIF, more specifically the Central Veterinary Laboratory of the Departments of Livestock Health and Entomology, the Coordinating Office for the Control of Trypanosomiasis in Uganda, the National Drug Administration (NDA), and research and academic institutions such as the National Agricultural Research Organization (NARO) and College of Veterinary Medicine, Animal Resources and Bio-security, Makerere University. At the local level, the main functional units of government veterinary services include the DVOs and DADIs representing MAAIF and NDA respectively.

Non-governmental organizations

According to the recent report on aid actors and projects in Karamoja, there are 14 NGOs supporting livestock activities through 19 projects, funded by bilateral or multilateral donors (KRSU, 2016). This indicates that animal health service delivery in Karamoja relies heavily on NGO support; the various animal health-related activities implemented by NGOs in each district are summarized in Annex 7. The activities encompass the different aspects of veterinary services supported through government, private actors, and often directly to livestock owners. The activities can be summarized as: training of the various actors (such as CAHWs, livestock owners, government staff, etc.); purchase and supply of drugs to CAHWs and often to livestock owners; supporting DVOs to carry out disease surveillance and vaccination to control disease outbreaks; and enhancing the capacity of drug shops. The DVO support involved establishing disease-reporting mechanisms, supplying cold chain facilities, and funding vaccination campaigns, including the purchase of vaccine and covering transport and per diems for DVOs and CAHWs. Occasionally, NGOs have also supported veterinary research and laboratory diagnostic services.

Private actors

The private actors include: private veterinary pharmacies owned or supervised by veterinarians; drug shops owned and managed by AHOs/AHAs/AHTs, CAHW associations or cooperatives; CAHWs; traditional healers; “backpack” or mobile drug traders; and livestock owners.

- **Veterinary pharmacy or drug shop**

According to a recent review by VSF-Belgium (2016), there are about 31 drug shops operating in Karamoja. The drugs shops visited during this review were grouped into three categories based on the professional qualification of the owners/managers (see Annex 6). They included veterinary pharmacies owned, managed, or supervised by veterinarians distinguished here as private veterinary pharmacies (PVPs), and drug shops owned and

managed by veterinary paraprofessionals (VPPs), including AHOs and CAHWs, individually or as an association or cooperative. The PVPs were limited in number, and the majority of the drug shops were set up by CAHW associations, which made up about 55 percent of the private facilities reviewed.

- **Community Animal Health Workers**

The CAHWs were trained by NGOs to deliver basic curative and preventive veterinary services to fill the gaps in service delivery following structural adjustment in mid-1980s and early 1990s. The current veterinary legislation and policy in Uganda does not recognize CAHWs as service providers, although there is informal recognition locally; e.g. DVOs use CAHWs to assist with vaccination programs. This informal recognition stems from the inaccessibility of Karamoja and its limited appeal to veterinary professionals and higher levels of paraprofessionals due to the poor infrastructure, harsh climate, logistical constraints, insecurity, and perhaps above all, the pastoral livestock production system prevailing in the region.

- **“Backpack” drug retailers**

These are individuals with no veterinary training who sell drugs, mainly on market days. Every district has at least one market day per week, with different districts using different days. The backpack drug retailers use this opportunity to increase their sales by moving from one market to the other. For example, during a visit to Moroto market, three backpack retailers were observed selling a variety of medicines that were spread on the ground (see Figure 5).

- **Livestock owners**

Although livestock owners appear to be consumers of veterinary services, they also have a direct involvement in veterinary services in at least four ways:

- Several key informant interviews with CAHWs, the livestock owners themselves, and NGO veterinary personnel revealed that many livestock owners treat their own animals. While some of these individuals received training through P/APFS, others were doing it without any training but just by learning from observation.
- Livestock owners also participate in veterinary service through traditional medicine provided by a few members of the community, although reliance on this is declining with increased introduction of modern medicine and vaccination.



Figure 5. Backpack (open market) drug retailers observed in Moroto market (Photo source: Dawit Abebe)

- Livestock owners are key sources of information on disease outbreaks and are the main actors involved in preventing disease spread by controlling livestock movements.
- Livestock owners are involved in veterinary public health.

Although identifying the services provided by different actors is important, assessing their contribution to the reduction of disease impacts is much more important. However, measuring this for all service providers is very complex, because actors may be involved in multiple aspects of veterinary services, and at different scales of service provision. Furthermore, the performance of some partly depends on the performance of others. For example, the success of CAHWs relates to the quality of the training they received, which is the responsibility of the veterinarian or other person who conducts the training. It is also necessary to understand service provision against demands for services, and for this question, the review took two complementary approaches, viz. assessing the distribution of the veterinary manpower and staffing levels, and assessing the effectiveness and sustainability of the service providers.

3.5.2 Distribution of veterinary manpower and staffing levels in Karamoja

3.5.2.1 Distribution of veterinary workers by district

Table 3 shows the number of veterinarians and VPPs involved directly in the provision of veterinary services (including treatment, vaccination, drug supply, and surveillance) in government and private services in each district. In public veterinary services, veterinarians were largely concentrated in the district headquarters.

The employment of public sector AHOs/Animal production officers (APOs) runs contrary to the civil service reform that excludes employment of paraprofessionals in public services but was an attempt to compensate for the limited number of government veterinarians. However, all districts were in the process of recruiting more veterinarians. Some of the DVOs noted that local government had the mandate to identify and employ public servants (as per the Decentralisation and Local Government Act), but implementation had been constrained due to weak institutional capacity of the districts, limited fiscal devolution, and other factors.

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Table 3. Distribution of veterinary manpower in Karamoja by districts

District	Public veterinary service providers		Private veterinary service			Total	
	Vets	AHOs	Vets	AHOs/AHTs/ CAHWs involved in drug shop business	CAHWs in the field	Vets	AHOs/AHTs/ CAHWs
Kaabong	2	2	0	3	75	2	80
Kotido	2	3	1	4	60	3	67
Moroto	4	4	1	2	90	5	96
Nakapiripirit	5	0	0	3	80	5	83
Abim	2	1	1	2	20	3	23
Napak	2	7	1	6	80	3	93
Amudat	1	2	0	3	50	1	55
Karamoja sub-region	18	19	4	23	455	22	497

Similarly, the number of veterinarians involved in private practice in the region was very low. In addition to the poor infrastructure, several issues were identified that limited the involvement of veterinarians in private practice. Of these, perceptions around the low profitability of private services were a major concern.

3.5.2.2 Veterinary Livestock Units in Karamoja

Veterinary work force and staffing levels relative to the livestock population are an approximate measure of the availability of veterinary services (Umali et al., 1992). A simple approach for determining this is to estimate the number of Veterinary Livestock Units (VLUs) per veterinarian and per veterinary auxiliary/paraprofessional

(De Haan and Bekure, 1991; Umali et al., 1992). A VLU is an animal unit based on the animal health care needs and is calculated from estimates of livestock populations by species using conversion coefficients: 1 VLU is equivalent to 1 cow or 1 camel, or 2 horses, 2 pigs or 2 donkeys, or 10 small ruminants, or 100 fowl (De Haan and Bekure, 1991; Umali et al., 1992).

Accordingly, the total VLUs by district and region (Table 4) were calculated based on the livestock population data in Table 1. The VLUs were calculated using cattle and small ruminants, because these are the main species receiving veterinary care in Karamoja.

Table 4. Total Veterinary Livestock Units per district in Karamoja

District	Cattle		Sheep and Goats		Total VLUs
	Number	VLUs	Number	VLUs	
Kaabong	518,465	518,465	950,118	95,012	613,477
Kotido	694,247	694,247	1,090,826	109,083	803,330
Moroto ¹	352,867	352,867	687,200	68,720	421,587
Nakapiripirit ²	674,746	674,746	937,041	93,704	768,450
Abim	13,635	13,635	45,610	4,561	18,196
Karamoja sub-region	2,253,960	2,253,960	3,710,795	371,080	2,625,040

¹Includes Napak data.

²Includes Amudat data.

The recommended VLUs per veterinarian and VPP vary depending on two contexts: the types of veterinary service required (such as curative or preventive or both) and the types of production systems, such as intensive or extensive. The analysis of veterinary staffing levels in this review was based on the recommendations for extensive livestock production systems such as pastoralist systems, in which Sandford (1983) recommended a staffing level of 200,000 VLUs per veterinarian and 12,000 VLUs per VPP, for preventive veterinary services carried out by the public veterinary service (cited by De Haan and Bekure, 1991). For curative and preventive veterinary services, a staffing level of 20,000 VLUs per veterinarian was used as an approximate optimal staffing level in an extensive production system (Umali et al., 1992). This figure was used to assess private services, as they provide both preventive and curative services.

3.5.2.3 Estimating VLUs for preventive services provided by government

The levels of VLUs per veterinarian and per VPP for preventive veterinary services per district are shown in

Table 5. The ratio of VLUs per veterinarian in Kaabong and Kotido were above the recommended ratio of 200,000 VLU per veterinarian, indicating a shortage of 213,477 and 403,330 VLUs per veterinary professional in Kaabong and Kotido respectively (see Column b in Table 5). Thus, in addition to the existing veterinary professionals, there should be one more in Kaabong and two more in Kotido. The other districts had ratios ranging from 9,098 to 128,075 VLUs per veterinarian, indicating no shortage of veterinary professionals for preventive services. However, geographical coverage also must be considered (see below).

In all districts, the ratio of VLUs per VPP did not meet the recommended level of 12,000 VLUs per VPP, and ranged from 18,196 to 382,225 VLUs per VPP (see Column c in Table 5). This indicates a substantial gap in VPPs across all districts and implies a shortage of AHOs/AHTs in the public sector (see Column e and g in Table 5). These figures reflect the impact of public service reform, under which VPPs were largely removed from government employment in Karamoja.

Table 5. Veterinary Livestock Units per district for preventive services

District	Total VLUs (a)	Based on present staffing level		Gaps in VLUs and staffing level		Viable staffing level		With CAHWs involvement at 12,000 VLUs per VPP
		VLUs/Vet (b)	VLUs/VPP (c)	VLUs/Vet (d)	VLUs/VPP (e)	Vet (f)	VPP (g)	With only 70% CAHWs functional of existing number (h)
Kaabong	613,477	306,738	306,738	213,477 (1 vet)	589,477 (49 VPPs)	3	51	11,685
Kotido	803,330	401,665	267,777	403,330 2 vets)	767,330 (64 VPPs)	4	67	19,127
Moroto ¹	421,587	70,265	38,326		289,587 (24 VPPs)	2	35	3,543
Nakapiripirit ²	768,450	128,075	384,225		744,450 (62 VPPs)	4	64	8,445
Abim	18,196	9,098	18,196		6,196 (1 VPP)	0	2	1,300
Karamoja sub-region	2,625,040	145,836	138,160		2,397,040			8,242

¹Includes Napak data.

²Include Amudat data.

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Table 6. Veterinary Livestock Units for preventive service by geographical area of districts

Districts	Total VLU (a)	District area (km ²) (b)	VLUs/km ² (c)	Expected area covered by existing staffing level (km ²) per		
				Vet (d)	VPP (e)	CAHWs (with 70% of existing number being functional) (f)
Kaabong	613,477	7,300	84.0	3,650	3,650	139
Kotido	803,330	3,618	222.0	1,809	1,206	86
Moroto ¹	421,587	8,511	49.5	1,419	38,326	72
Nakapiripirit ²	768,450	5,834	131.7	972	2,917	64
Abim	18,196	2,337	7.8	1,169	2,337	167
Karamoja sub-region	2,625,040	27,600	95.1			

¹Includes Napak data.

²Includes Amudat data.

Table 7. Present VLUs per private practice available for curative and preventive veterinary service by private animal health providers

District	Total VLU	VLUs per PVP (vet)	VLUs per:	
			Drug shops (operated by AHOs/AHTs/ CAHWs)	CAHWs operating in the field with 70% of them functioning
Kaabong	613,477	0	306,738	11,685
Kotido	803,330	803,330	401,665	19,127
Moroto ¹	421,587	210,794	30,113	3,543
Nakapiripirit ²	768,450	0	85,383	8,445
Abim	18,196	18,196	3,639	1,300
Karamoja sub-region	2,625,040	656,260	437,507	8,242

¹Includes Napak data.

²Includes Amudat data.

Although the number of veterinary professionals in Moroto, Nakapiripirit, and Abim meets the recommended ratio of 200,000 VLUs per veterinarian, an important consideration is the livestock distribution. In arid and semi-arid pastoral systems, livestock distribution is highly variable spatially and seasonally because of rainfall and pasture variability. For this reason, the review examined livestock densities (VLU/km²) and the expected coverage areas per veterinarian (km²). To determine this, the livestock density (VLU/km²) in each district was calculated by dividing the total VLUs by district area. Then, the expected coverage area per VLU or veterinarian for preventive service was calculated by dividing the recommended ratio of 200,000 VLUs per veterinarian by the values of VLU/km² in each district. The result showed that the livestock density per district ranged from 7.8 to 222 VLU/km² in Abim and Kotido respectively (see Table 6).

As shown in Table 6, based on the existing veterinarians (column d) and VPPs (column e), the area covered for preventive actions is very large. However, the presence of CAHWs to support government activities has substantially increased the area that can be reached (column f).

3.5.2.4 Estimating VLUs for curative and preventive services

The review categorized private clinical services such as disease diagnosis, treatment, and drug supply as curative services for the sake of VLU calculations, and assessed the number of PVPs, VPPs, and CAHWs. The PVPs include veterinarians running their own pharmacy, or working as a partner or an employee. The VPPs included AHOs/AHTs/CAHWs who were managing drug shops as owners or as employees for other individuals or associations/cooperatives, and CAHWs who were providing clinical services in the field. Although the standard VLU for

curative and preventive service was used i.e. 20,000 VLUs per veterinarian, different models of private service were assessed (Table 7).

As shown in Table 7, the value of 0 VLU per veterinarian (PVP), means there is no private veterinarian providing curative and preventive service in Kaabong or Nakapiripirit. In other districts, PVPs are insufficient relative to the minimum standard 20,000 VLUs per veterinarian, except in Abim.

Similarly, for AHOs/AHTs (drug shops), the VLUs for curative and preventive services are substantially higher than the minimum ratio. This implies a low level of engagement of veterinary professionals and VPPs in private practice in Karamoja, and indicates that most livestock owners do not have access to clinical services. On the other hand, the high VLUs per PVP or VPP (drug shops) can be interpreted as the presence of large numbers of animals to serve and implies a high potential economic viability of the business. However, this depends on the range of services provided and livestock density. The business performance of a PVP or drug shop in Karamoja depends heavily on drug sales, which in turn means that many livestock owners need to be reached.

De Haan and Nissen (1985) suggested 30 VLU/km² as a minimum livestock density required for a viable professional veterinary practice. As shown in Table 8, the VLU/km² in each district is larger than the minimum required, indicating the potential for private services. However, in pastoral production systems, livestock density is not constant due to seasonal movements to access

pasture and water. Therefore, the clinical service provider needs to be able to respond to variations in livestock densities over time.

The estimate of expected area covered by each service provider is calculated by dividing the district area by the number of PVPs and VPPs operating drug shops (i.e. AHO/AHT/CAHW association). As indicated in Table 8, the areas to be covered by these service providers were very large. Many livestock will be out of reach. However, a network of CAHWs fills the gaps in coverage. As shown in Table 8 (column f), the use of CAHWs greatly reduces the area that a PVP or VPP needs to cover directly.

It is clear from the above analysis of the number and distribution of veterinary workers that CAHWs fill large gaps in public preventive services as well as in private clinical services. With the presence of CAHWs, the number of service providers in Karamoja is adequate, and effective disease prevention or control is more a question of the effectiveness and sustainability of the service providers.

3.6 EFFECTIVENESS AND SUSTAINABILITY OF ANIMAL HEALTH SERVICE PROVIDERS

The effectiveness and sustainability of the AHSPs were assessed, focusing on the public and private AHSPs, based on matrix scoring of accessibility, availability, affordability, acceptability, and quality by focus group informants in four sites. As the involvement of NGOs in animal health delivery was indirect through supporting the public and private actors, their effectiveness can be analyzed indirectly. The results are summarized in Table 9.

Table 8. Veterinary Livestock Units per unit area and expected coverage of clinical service by private animal health service providers

Districts	Total VLUs (a)	District area (km ²) (b)	VLUs/km ² (c)	Expected coverage area (km ²) per		
				PVP (d)	Drug shops operated by AHO/AHT/CAHWA (e)	CAHWs operating in the field with 70% of them functioning (f)
Kaabong	613,477	7,300	84.0	0	3,650	139
Kotido	803,330	3,618	222.0	3,618	1,809	86
Moroto ¹	421,587	8,511	49.5	4,256	1,216	72
Nakapiripirit ²	768,450	5,834	131.7	0	648	64
Abim	18,196	2,337	7.8	2,337	467	167
Karamoja	2,625,040	27,600	95.1	6,900	1,255	87

¹Includes Napak data.

²Includes Amudat data.

Table 9. Matrix scoring of animal health service providers

Indicators	Median score (range)								
	Government veterinarian	Private						Backpack drug supplier	Traditional healer
		PVP	CAHWA drug shop	AHO	CAHW's				
ACCESSIBILITY									
<ul style="list-style-type: none">This service is close to us.	•• 2 (0-3)	••• •• 5 (0-7)	•••• •••• 8 (6-10)	•••• ••• 7 (6-8)	••••• ••••• 10 (9-12)	••• •• 5 (4-12)	••••• ••••• 13 (11-15)		
AVAILABILITY									
<ul style="list-style-type: none">This service is available always when needed.This service has all the medicines needed.	•• 2 (1-2)	••• ••• 6 (0-12)	••••• ••••• 11 (10-15)	••••• ••••• 11 (7-13)	•••• •••• 8 (7-10)	•••• ••• 7 (4-9)	••• •• 5 (4-7)		
AFFORDABILITY									
<ul style="list-style-type: none">This service provider is less expensive.There is willingness to pay for a high-quality service provider.	••••• •••• 9 (9-10)	••• ••• 6 (5-6)	•••• ••• 7 (6-7)	••• ••• 6 (5-6)	••• ••• 6 (4-6)	••••• •••• 9 (8-9)	••••• •••• 9 (8-10)		
QUALITY									
<ul style="list-style-type: none">More animals usually recover with this service.This provider offers more services.The medicine from this provider is always effective.	••••• ••••• 10 (8-10)	••••• ••••• •• 12 (11-13)	••••• ••••• 10 (8-10)	••••• ••••• 10 (9-11)	•••• •••• 8 (6-8)	••• 3 (1-3)	• 1 (0-2)		
ACCEPTABILITY									
<ul style="list-style-type: none">We trust this service provider.	••• •• 5 (3-6)	••• •• 5 (4-6)	••••• ••••• 10 (8-11)	••• •• 5 (4-6)	••••• ••••• 16 (14-18)	• 1 (0-2)	••••• •••• 9 (9-11)		

3.6.1 Accessibility

Accessibility was assessed by asking questions about the physical proximity of each of the AHSPs to the community. The traditional healers received high scores, followed by CAHWs, followed by drug shops, backpack drug traders, and government veterinary staff. The lower accessibility score for CAHWs relative to the traditional healers was explained by the fact that CAHWs were found concentrated in sub-county centers, which are far from villages and cattle *kraals*. The map showing the distribution of CAHWs in Karamoja, produced by FAO, supports community views of CAHWs as relatively inaccessible, with CAHWs clustered around towns and along principal roads (Annex 8). This may stem from limited coordination between the NGOs involved in training of CAHWs (see section 3.7) or could indicate that CAHWs move to more populated areas because there are higher sales potential and better living conditions.

3.6.2 Availability

Availability was assessed using three indicators: the physical presence of the AHSPs (e.g. a drug shop might open regularly and predictably or might have irregular opening hours); the quantity and variety of medicines the AHSP can offer; and the advice offered by AHSPs on matters such as the dosage, administration, and handling of drugs. In general, drug shops received high scores on indicators of availability. Individually owned drug shops scored better than drug shops owned by associations in terms of physical presence and stocks of medicines. However, private drug shops owned and managed by a veterinarian or an AHO/Animal health assistant (AHA) and some CAHW associations tend to provide additional professional or paraprofessional services directly to livestock owners, or indirectly through CAHWs. These community views were consistent with findings of key informant interviews and observation of the activities of drug shops. For example, during the visit to MIONA Veterinary Centre in Moroto, ALOEVET in Napak, and PAVENET and JICAWA in Kotido, there was a chance to observe interactions between the customer and drug dispenser. Further information on each drug shop is summarized in Annex 6.

Backpack traders received lower scores for availability because they were only available on market days (i.e. once a week in most districts), and their service focused on drug sales only, with limited advice provided. Of three individuals observed in Moroto open market selling medicines, only one provided any advice (such as appropriate storage and administration of the medicine purchased). The low availability of government veterinary staff was attributed to the low staffing levels. The very few staff who were available were engaged mainly in administrative activities and so were not available for consultation with livestock owners or CAHWs. Above all, the government veterinary service did not stock medicines, as this is the mandate of the private

sector. Therefore, government availability related only to vaccination campaigns.

Traditional medicines also scored well in terms of availability. The score for CAHW availability related to stocks of medicines. Interviews with CAHWs and community members revealed that a large proportion of the CAHWs failed to restock following the initial supply of medicines from NGOs. Instead of self-restocking, they expected free restocking from NGOs. Similar dependence behavior was also displayed by drug shops established by associations, which tend to rely largely on repeated support from NGOs.

3.6.3 Affordability

The assessment of affordability of AHSPs excluded government services because informants explained that the government did not sell medicines, and provided vaccination (free of charge). Among the private AHSPs, traditional medicine was the most affordable, followed by backpack drug traders, drug shops, and CAHWs. The low affordability of CAHWs relative to drug shops was mainly in the cases where the CAHWs were stocked from association drug shops. With a profit markup, the drugs from the CAHWs were costlier than the retail price in the association drug shops. An assessment of CAHWs commissioned by Oxfam reported markups of between 11 to 200 percent depending on type of drug and turnover (Acacia Consultants Ltd., 2007). Regardless of the low affordability of CAHWs, they were still often preferred, because they provided services on credit.

Although herders recognized the affordability of backpack traders, they also recognized the risks of cheaper drugs in terms of lower quality and treatment outcomes. Therefore, medicines from drug shops were preferred despite the higher cost. Key informant interviews with veterinarians and AHOs/AHAs running private veterinary pharmacies indicated that herders rarely complained about prices and did not hesitate to pay for medicines. As the owner of the MIONA Veterinary Centre explained, “It’s true livestock owners negotiate in attempt to get the price reduced, but this is not because the price is too high, rather when they are not sure if the medicine is of a good quality. However, when we give them more confidence on the quality, they just get a bundle of rolled money from under their belt and pay with no hesitation.” The increase in the number of legal veterinary pharmacies from none in the mid-1990s to about 30 in recent years clearly indicates the good market environment. This refutes the general perception among some NGOs about private veterinary services being unaffordable to the community. Personal observations at drug shops in Moroto confirmed that herder’s decisions to buy medicine were based not only on cost, but also on perceived quality, learned from previous experiences of the effectiveness of the drug; herders distinguished drugs based on the look of the package in terms of color, picture, etc.

3.6.4 Quality

Community perceptions about the quality of AHSPs were assessed in terms of: sick animals recovering after treatment; range of services (such as different types of drugs and advice on disease control, prevention, and veterinary public issues, etc.); and the quality of the drugs provided. Accordingly, government veterinary staff, PVPs, and AHOs/AHAs received high scores for positive recovery outcomes, with little difference between them. Although CAHWs were rated better than backpack drug dealers and traditional medicine on recovery outcomes, they tended to score low compared to veterinarians and higher-level paraprofessionals. These perceptions on the low recovery of animals treated by CAHWs agree with the assessment of their theoretical knowledge and skills in disease diagnosis and treatment (see section 3.6.6). However, the low recovery rate of animals treated by CAHWs in Karamoja is contrary to evidence from other areas with well-trained CAHWs (e.g. Oakeley et al., 2003; Mugunieri et al., 2004; Abebe, 2005; Admassu et al., 2005; Rubyogo et al., 2005; Bekele and Akuma, 2009; Leyland et al., 2014).

In terms of the range of services provided, all private AHSPs scored higher than the government veterinary service, except the backpack drug suppliers. The services provided by government were vaccination campaigns in response to disease outbreak, and these activities were reported to be irregular and delayed in many cases. Tsetse fly control using pour-on insecticide was the other government intervention observed, but in limited areas and on a pilot scale. Although private actors do not stock vaccines (except Sagovet in Abim, which had a stock of Newcastle disease vaccine), they were rated better than government service. Generally, there were limited differences between PVPs, AHOs/AHAs, and CAHWs on the range of services provided, although PVPs and AHOs/AHAs were identified as better than CAHWs in terms of the range of medicines and corresponding advice. In contrast, CAHWs were identified as participating in vaccination, tsetse control, and awareness creation on disease control, prevention, and veterinary public health messages.

There was no difference between PVPs, AHOs/AHAs, and CAHWs in terms of the quality of medicines supplied, although CAHWs were rated low on stocks of medicines (see section 3.6.2). The backpack drug traders scored the lowest on all quality measures. Likewise, traditional healers did not score well for medicine quality, because traditional medicines were viewed as less effective than modern medicines.

3.6.5 Acceptability

Community acceptance of AHSPs was assessed, mainly by using the concept of trust and related explanations from informants. Accordingly, CAHWs consistently scored better than other AHSPs (see Table 9), because they are part of the community. A language barrier was mentioned as the major issue affecting the poor trust of veterinarians and AHOs who were not from the same socio-cultural background or who do not share the same values. As a livestock owner in Kotido explained, “CAHWs understand our problem better than others, when we are not able to pay they give us service on credit. They feel the pain of losing an animal, and we know they do not fail us.” Backpack drug retailers were the least trusted, scoring zero on trustworthiness. As focus group informants comment, “We do not know this people, and we just meet them in the market.” They were suspicious about the quality of the backpack drug retailers’ medicines.

3.6.6 Competence of CAHWs

The competence of CAHWs was assessed based on their technical knowledge, range of activities handled, and level of motivation. These indicators reflected the quality of training and were measured using Likert scales, e.g. very good, good, poor, and very poor. Specific issues investigated under each of the indicators and measures are detailed in Annex 1. Twenty-five CAHWs from four districts (five in Napak, six in Kotido, nine in Kaabong, and five in Amudat) were assessed.

The findings on CAHW competence are summarized in Figure 6. Overall, technical competence was a concern, with 60 percent of CAHWs assessed as “poor” or “very poor.” This indicated a problem with CAHW training, and it was noted from interviews with veterinarians and a review of training reports that illiteracy of trainees was identified as a major challenge. In turn, this indicated that the training approach was based largely on lectures rather than the use of practical sessions. The same training reports also identified a lack of veterinary equipment and medicines for use during practical sessions of the training. The fact that most training in the region was carried out in towns and away from livestock (see Annex 3) further shows the limited opportunity for practical sessions. Good practices for CAHW training have been known since the 1990s and, for illiterate trainees, focus on the use of participatory adult learning methods and hands-on practical sessions (Iles, 2002a; 2002b). These good practices seem not to have been widely applied during more recent CAHW training in Karamoja.

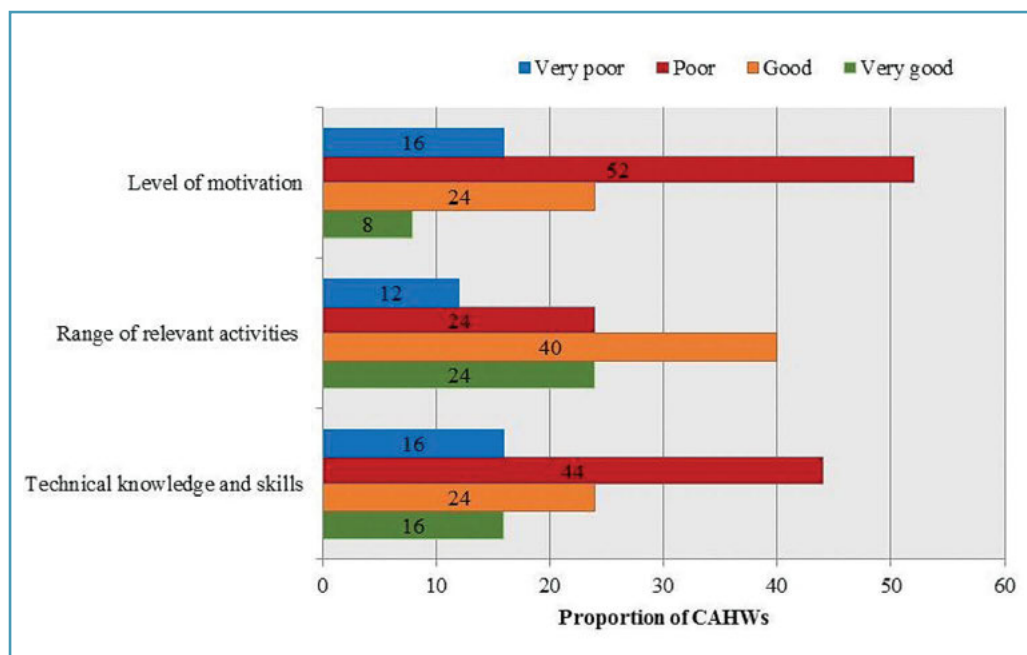


Figure 6. CAHW competence

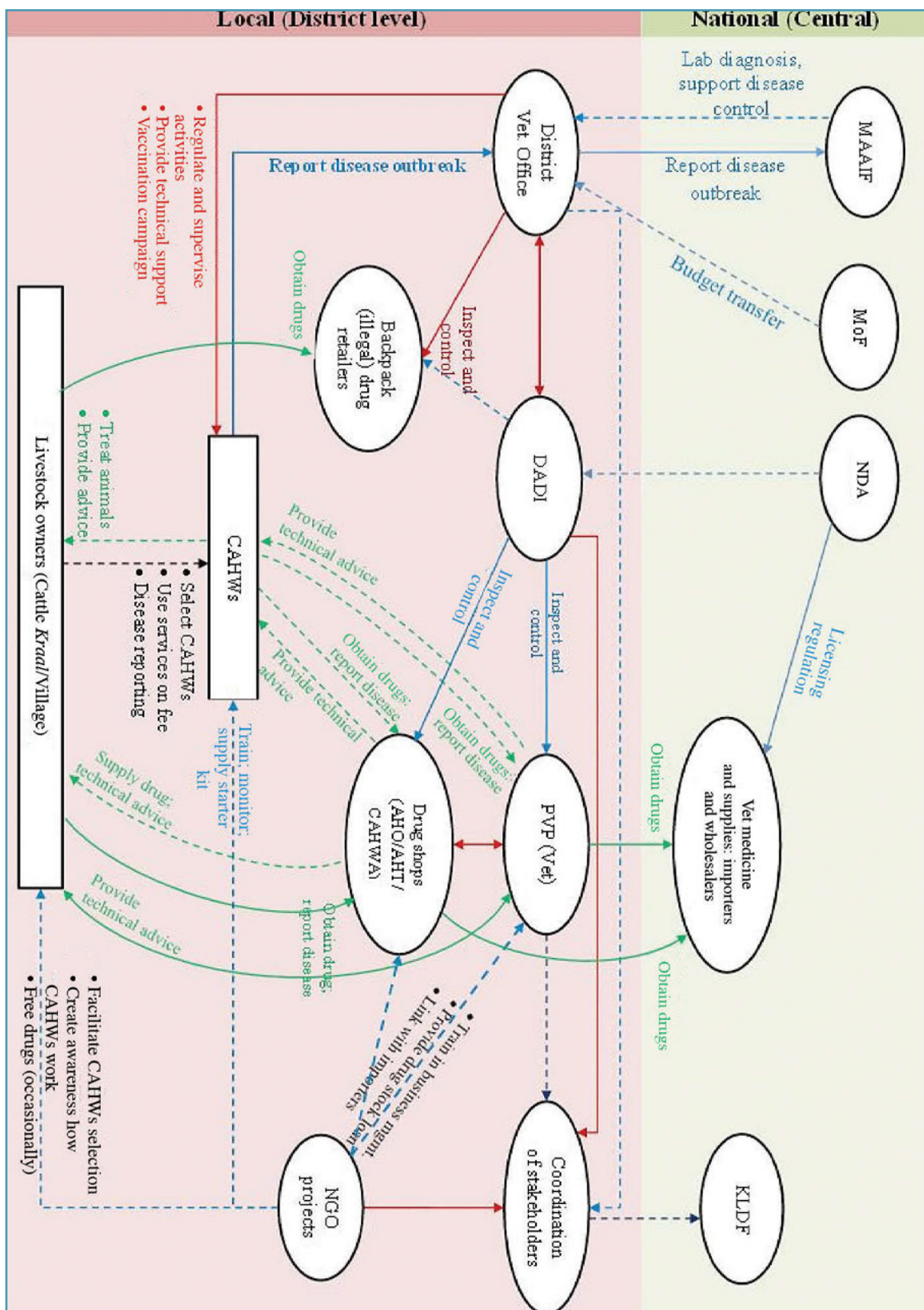
In terms of the range of activities handled by CAHWs, this reflects the training curriculum, which should focus on functional knowledge and skills related to disease control. In addition, the specific diseases covered should in part be based on participatory assessments and disease prioritization with livestock keepers (Hadrill et al., 2002). However, the training courses reviewed included too much emphasis on general livestock production such as housing, breeding, nutrition, etc. (see column on training content and methodologies in Annex 3) relative to the priority topics related to disease diagnosis, prevention, and treatment.

The level of CAHW motivation was low, and interviews indicated that CAHWs spent most of their time in sub-county centers and peri-urban areas, far from cattle *kraals*, wondering when the next vaccination campaign or refresher training might happen. Some CAHWs were involved in various other NGO activities, such as nutrition or conflict programs. The poor motivation to work as CAHWs stems from a lack of supervision by or close interaction with government or NGO veterinarians who are supposed to provide post-training support. Weak drug supply was another cause of low motivation, leading to declining income from CAHW work. However, this issue is also related to the provision of services on credit; CAHWs did not have sufficient capital to restock with drugs. Again, good practices for the design of CAHW systems specifically warn against the provision of services on credit (Catley et al., 2002; Abebe, 2005).

3.7 INSTITUTIONAL AND COORDINATION ISSUES

From previous sections of the report, it is evident that there are several AHSPs in Karamoja, acting either as a primary service provider, or supporting one or multiple facilitative services. No single actor was providing or supporting all the components of the veterinary service because of the different mandates of different actors; e.g. between central versus local levels or between public versus private sectors. Likewise, NGO activities varied in terms of the specific aspects of veterinary service supported and the geographical coverage. There were also differential capacities, with some actors performing better than others; e.g. some agencies specialize in animal health services and have in-house capacity, whereas for other agencies animal health is a secondary activity. The fact that the various components and sub-components of a veterinary service are interdependent makes it impossible to ensure effective and sustainable animal health delivery in its entirety as a system without strong interaction and linkages between the different service providers. Therefore, the review investigated these interactions and analyzed the flow of information or services between actors and the related outcomes. The expected interactions and interrelationships between the various AHSPs, vertically and horizontally, are illustrated in Figure 7.

Figure 7 Interactions and interrelationships between stakeholders



3.7.1 Interactions across the structure of the government veterinary service

Although at central level several government institutions are involved in animal health activities, here we focus on the interaction and linkage across the structure of MAAIF. DVOs are responsible for passing reports of disease outbreaks from CAHWs to the central MAAIF, particularly the Department of Livestock Health and Entomology (DLHE) and the Division of Disease Control (DDC). DVOs also endorse reports that are reported directly to DDC using the EMPRES-i EMA system. The DDC is then responsible for collecting specimens, undertaking laboratory diagnosis, and providing results. In cases of confirmed outbreaks of transboundary animal diseases, DDC provides support to the district with control measures, including the supply of vaccines.

However, it was only reports of suspected disease outbreaks from CAHWs or livestock owners to the DVO that happened consistently. As noted in section 3.4.2, the speed with which this information reached the DDC improved substantially after the introduction of the EMPRES-i EMA system. However, the limited or delayed response of MAAIF-DDC to the reports of disease outbreaks was raised as a major concern by DVOs. On the other hand, the MAAIF-DDC and veterinarians in other central institutes (such as Uganda Veterinary Association) reported a general deterioration of veterinary services nationally, which they attributed to the decentralization of veterinary governance. In addition, DVOs reported inadequate or delayed transfer of budgets from central government (Ministry of Finance) as a major obstacle to diseases outbreak response. They also reported limited and delayed vaccine supply from MAAIF.

3.7.2 Interaction between private actors: What type of service delivery model exists?

At least four types of private veterinary service delivery models are seen in pastoralist areas (Catley et al., 2004). These are:

- A private veterinary pharmacy/clinic (PVP) managed or staffed by a veterinarian, to which private animal health assistants (AHAs) and CAHWs are linked hierarchically, with the veterinarian ensuring drug supply and providing technical support;
- A private AHA/AHT linked with CAHWs, supervised by a government veterinarian;
- An association or cooperative model, in which CAHWs are organized into associations or cooperatives to manage a pharmacy, and individual CAHWs are linked to associations for drug supply;
- A *duka* model involving the sale of veterinary drugs along with other items, such as human medicines and consumer items, in small shops.

To this list can be added an “independent CAHW” model, in which CAHWs are provided with an initial supply of medicines, usually by an NGO, and then work with out clear links to other actors for supervision or drug supply.

The status of private AHSPs in Karamoja was assessed based on four main questions. How did the service provider enter private practice (including source of capital and legality)? Who are their customers? What services do they provide? Where do they buy drug stocks and/or get technical support? (See Annex 6). Based on the information acquired, the existing private veterinary service models in Karamoja are summarized in Table 10.

Table 10. Models of private animal health service providers

Private veterinary service models	Remarks
1. Private vet pharmacy model	
<ul style="list-style-type: none"> • A vet owns and manages the business independently. • A CAHW is employed as an attendant (dispenser) of the drug shop. • Advice on appropriate administration of medicines and handling is provided as an additional service. • Drug stock is procured from importers and distributors in Kampala. 	Viability is precarious because of slow drug turnover and seasonality of the market.
2. NGO-private vet model	
<ul style="list-style-type: none"> • A vet employed by an NGO also owns and manages the business in partnership with an AHO. • A CAHW is incorporated as an attendant of the drug shop. • Additional services such as technical support to CAHWs during vaccination and tsetse control is provided. 	The business is showing incremental growth. The supplementary employment income may have helped, although a concern about conflict of interest has been raised.

Continued on next page

3. CURRENT VETERINARY SERVICES IN KARAMOJA

Continued from previous page

Private veterinary service models	Remarks
<ul style="list-style-type: none"> • Livestock owners are advised on appropriate administration and handling of medicines. • CAHWs are provided advice by phone when they seek it. • Drug stock is procured from importers and distributors in Kampala. 	
3. Private vet—association model	
<ul style="list-style-type: none"> • A vet provides overall supervision and management of the drug shop. • The vet is also involved in other business outside the region. • A CAHW manages the day-to-day activity of the drug shop. • Technical advice is provided to livestock owners. • Drug stock is procured from importers and distributors in Kampala. 	<p>This model is struggling with the bureaucratic process of involving the leadership of the association in the management of the shop.</p>
4. AHO model	
<ul style="list-style-type: none"> • The AHO owns and manages the business with no employees. • The drug shop is closed or left under the attendance of a family member or friend with no veterinary knowledge if AHO must be away. • Drug stock is procured from importers and distributors in Kampala. 	<p>Model has lower overhead cost as no employee is involved, and it seems a viable option.</p>
5. Government—private AHO model	
<ul style="list-style-type: none"> • AHO is employed by local government and at the same time operates a drug shop retail business. • The employment provides the main income for the AHO. • A CAHW is involved to manage the day-to-day activities of the drug shop. • Drug stock is procured from importers and distributors in Kampala. 	<p>At present, model is viable, subsidized by income from employment, though full-time private practitioners complain that this model is unfair competition for them. Existing legislation does not prohibit government employees from practicing privately on the side.</p>
6. CAHWA-CAHWs	
<ul style="list-style-type: none"> • A CAHWA operates a drug retail business. • A CAHW is appointed as the manager and attendant of the drug shop. • None are supervised by a veterinarian. • There is very poor management and misuse of capital. • Drugs are provided to member CAHWs at a price lower than when drugs are sold directly to the livestock owners. • Drug stock is procured from importers and distributors in Kampala or from middle-level distributors in Soroti. 	<ul style="list-style-type: none"> • When they were supported by vets, they had a good prospect of sustainability. • At present, some have failed, and others are struggling to survive. • NGOs are expected to provide drug stock.
7. CAHW model	
<ul style="list-style-type: none"> • CAHWs operate the shop independently. • There is no supervision by a veterinary professional. • Drugs are rarely restocked from drug shops, and if they are, they are bought from anywhere. • The large majority of CAHWs were active only during vaccination campaigns. 	<ul style="list-style-type: none"> • There is a high expectation of receiving drug stock from NGOs. • Capital is declining because of service provision on credit and failure to collect money owed.

Although some NGOs have been attempting to establish a PVP model linked with AHOs and CAHWs, across the region there was little sense of a coherent approach. The flow of drugs, technical support, and advice between different veterinary facilities was not consistent and did not amount to a recognizable system. The relationship between the service providers was fragmented and driven by a sense of competition. The livestock owners buy drugs from any outlets, including the PVPs, AHO drug shops, associations, and backpack drug retailers (see Figure 7). However, only some of these outlets provide advice on animal health issues, such as correct drug usage. The viability of the main private veterinary models is discussed below.

Private veterinary pharmacy model

A PVP or clinic, managed by a veterinarian and linked with AHAs and CAHWs, is one option for pastoralist areas (AU/IBAR, 2003) and is seen as more viable than a veterinarian working alone. This is because business viability depends heavily on drug turnover, and the CAHWs provide a drug sales and distribution network that can greatly increase the overall drug turnover of the business. For a private veterinarian in a traditional livestock production system, such as a remote pastoral area, Umali et al. (1992) estimated that for an income of US\$10,000 per year, a 50 percent margin on drug sales and 14,720 VLUs/km² were needed to break even. However, for a private veterinarian to serve 14,720 VLUs, a wide geographical area has to be covered, with high transport costs (e.g. if using a 4WD vehicle). In addition, a margin on drug sales of 50 percent will not allow the business to compete with alternative drug outlets such as drug shops owned by associations, occasional free drug supply from NGOs, and numerous backpack suppliers. These conditions indicate that private veterinarians in Karamoja may only be viable if they manage a network of veterinary paraprofessionals as a means to ensure sufficient geographical coverage and levels of drug turnover. Even then, some business diversification may be needed, such as the sale of agro-chemicals or other farm inputs (AU/IBAR, 2003).

The AHO/AHT model effectively cuts out the veterinarian and uses a veterinary paraprofessional with a diploma or certificate qualification in animal science or health to operate a private drug shop, under licence from the NDA. In Karamoja, this model shows far more promise, partly because AHOs have lower income and different lifestyle expectations relative to veterinarians. The AHOs observed were directly engaged with their business, while the veterinarians might leave the business under the management of employed CAHWs. For example, the veterinarians associated with Sagovet in Abim and ALOEVET Drug Shop in Napak were reported to be in Kampala for extended periods. According to research commissioned by African Union/Interafrican Bureau for

Animal Resources (AU/IBAR), the AHO/AHT business model was the most economically viable model for private veterinary services in pastoralist areas of Kenya (Okwiri et al., 2001), but only if there are strong linkages with CAHWs. However, these linkages are not evident in much of Karamoja, and AHOs and CAHWs do not tend to view each other as partners. Although the AHO/AHT model operates legally, there was no clear mechanism for technical support or supervision, e.g. by government. Under the OIE guidelines, all VPPs should work under the supervision of a veterinarian. Overall, while the AHO/AHT model is probably the most feasible approach, it remains hindered by weak linkages with CAHWs and weak supervision.

Association/cooperative model

The drug shops assessed in this review were mainly CAHW association shops, supported by NGOs, and one cooperative drug shop, run by the Nadunget Livestock and Produce Cooperative Society, established by government through the Millennium Development Promise (a program funded by the Islamic Development Bank). The economic sustainability of these shops was very questionable. Some of the CAHW association drug shops had already failed, and most of those remaining were operating at a low level of activity (see Annex 6). It has been known for many years that livestock user associations are not effective for service delivery in pastoralist areas of Africa (Catley et al., 2004), and a recent evaluation of CAHW systems in Ethiopia, Kenya, and South Sudan documented similar challenges associated with association models (Leyland et al., 2014). Few of the association shops had a certificate authorizing them to operate, and theoretically, the National Drug Policy and Authority Act, CAP 266, 1993 and the National Drug Policy of 2001 prohibit unregistered and unlicensed private practices.

Key informant interviews indicated that some of the association shops performed well in the past when they had a veterinarian supporting them in management and for technical issues. This was particularly the case with the Jie Community Animal Health Workers Associations (JICAHWA) drug shop. According to the shop manager, they had two veterinarians supporting them on a full-time basis at different times. In addition to managing the drug shop, the veterinarians also closely monitored the CAHWs and provided technical advice. The two veterinarians later left them and joined NGO projects, at which point the performance of the drug shop started to decline. Nevertheless, one of the veterinarians later opened a private practice—Naome Veterinary Centre—in Moroto.

These experiences indicate that NGOs might work with veterinarians in private practice for the design and implementation of CAHW programs, instead of employing veterinarians full-time. Part of this work would be to help veterinarians understand the business relevance

of CAHWs, e.g. for expanding their drug distribution and sales. This would not only encourage more veterinarians to enter private practice but would also address some of the bottlenecks to the sustainability of the system. It creates a natural linkage between the veterinarian and the CAHWs for supervision and technical support at a later stage, as opposed to the current situation where NGOs are struggling to link CAHWs with the drug shops for supply, and with DVOs for supervision.

Independent CAHW model

CAHWs operating independently was the most widespread model in Karamoja. The CAHWs started their service using the initial drug kit provided by NGOs after completing training. They were expected to restock using the capital from the sale of the initial kit supplies, but only a very few CAHWs were reported to have continued delivering services, and most were only functional during vaccination campaigns run by the government. Even the CAHWs who were still delivering curative services buy their supplies from drug shops, which may or may not also provide technical support. According to NGOs involved in the design and implementation of CAHW projects, DVOs were assigned the roles of supervision and on-the-job technical support at the planning stage. In an attempt to create links between CAHWs and DVOs, the DVOs were involved in the training of the CAHWs. However, in practice DVOs and CAHWs only meet during vaccination campaigns, implying that there was no substantive supervision or technical support provided by DVOs for the routine clinical work of CAHWs. In the absence of private veterinarians or AHOs providing supervision to CAHWs, this is a task for government veterinarians, but it was not taking place.

As noted in section 3.5.1, the predominant model of private veterinary activity in Karamoja involved livestock owners buying medicines from a range of suppliers (such as the PVP, AHO drug shop, CAHW association, or backpack suppliers) and treating their own animals. While some livestock owners have received training in basic disease diagnosis and treatment through P/APFS, the impact of this training is unknown in terms of the correct use of veterinary medicines. In Kenya, the P/APFS approach was a relatively costly and inefficient approach for transferring basic knowledge on veterinary drug use to livestock keepers (Catley et al., 2006). Most livestock owners in Karamoja probably treat their own animals with minimal knowledge on drug handling and use.

3.7.3 Inter-agency coordination

The other major gap in interaction and connectedness between service providers was that between the NGOs involved in CAHW projects. As summarized in Annex 7, the animal health programs of NGOs varied in two

ways. First, there was variation in the specific aspects of veterinary service that were targeted. Some NGOs focused on activities related to vaccination, whereas others attempted a full range of support, including training of CAHWs and activities related to drug supply. Second, the geographical coverage of NGOs was uncoordinated. In some areas, the number of projects was limited (e.g. Amudat) and in other areas, projects with similar activities were implemented (e.g. Kotido and Moroto). The overlaps and gaps may be larger at sub-county and parish level. In the context of establishing an effective and sustainable animal health service system, service delivery must be comprehensive in terms of quality and quantity of all aspects of veterinary services, and at all scales of administration, ranging from village to sub-region.

Although a livestock development forum exists in Karamoja (the Karamoja Livestock Development Forum (KLDF)), the focus was on large programmatic topics rather than practical issues. A similar coordination effort led by the District Local Government Planning Office was organized on a quarterly basis. At these meetings, there was an exchange of information on project activities and the budget available but limited discussion on the practicalities of coordination. The only practical collaboration between government and NGOs observed was during disease outbreaks, whereby the NGOs often procure vaccine and largely fund the implementation of vaccination in the field, which is coordinated by DVOs. More recently, Mercy Corps has been trying to initiate a Livestock Working Group at district level (DLWG), where livestock issues are discussed, led by the DVO. Meetings were reported to be taking place monthly in two districts. In the other five districts, the DLWGs were not as active or did not really function at all.

At the time of the review, some of the main symptoms of limited coordination and harmonization were:

- **Clustered distribution of CAHWs:** As shown in Annex 8, the CAHWs were clustered around centers of sub-counties and along main roads. Although previous insecurity in the region may have contributed to this distribution, other reasons could include repeated trainings carried out in the same area and CAHW expectations of involvement in vaccination campaigns or easier sales in these areas. Whatever the case, one of the main reasons for using CAHWs is to improve the accessibility of a basic veterinary service, and the clustering indicates that this aim is not being achieved.

- **No standard approach for the design and implementation of CAHW projects:** There was wide variation in the design and implementation of CAHWs projects across the different implementing agencies. By reference to good practices and indicators for CAHW systems (Catley et al., 2002; 2004; Leyland and Catley, 2002), most NGO projects were far from meeting the standard good practices. The major difference between programs were:

- Participants of the training: while some of the trainings targeted individuals, other conducted mass training of the livestock owners, regardless of the difference in issues covered in the training. The duration of initial training ranged from one week to several weeks.
- Some trainings were residential and others were not.
- Topics covered during training varied widely; some training included unnecessary details and issues, largely relevant to intensive livestock production systems rather than the systems in Karaomoja.
- Training design and methods varied, with some NGOs giving emphasis to theoretical over practical sessions.

- **Mixed organizational expertise:** There was wide variation between NGOs in terms of technical competence in CAHW systems. At least four different CAHW training manuals were used, with substantial differences in content and approach. There was limited attention to area-specific differences in disease priorities across different ecological areas within the sub-region. Efforts were underway during this review to standardize the CAHW training curriculum by the College of Veterinary Medicine, Makerere University, contracted by Mercy Corps. The capacity of Makerere University to handle this work was not assessed during the review.

The weak design and implementation of CAHW projects is perhaps the major factor leading to poor performance and sustainability (Iles, 2002a). This challenge was recognized in Ethiopia, and the government had developed minimum standards and guidelines for CAHW systems (MoARD, 2009).

3.7.4 Public-private interaction, legislation, and policy

There was very limited or no professional interaction and relationship between DVOs and the private

practitioners, except with CAHWs for vaccination work. Private veterinarians and AHOs operating drug shops complained that the government was sidelining them and not looking at options for contracting out certain activities to the private sector. For example, although government is mandated to control TADs, activities such as vaccination would probably be handled more effectively if contracted out (but under government supervision of contracts). In general, private practitioners viewed government as not being supportive of the sector and raised several legislative and policy constraints.

According to current veterinary legislation and policies in Uganda, many of the animal health activities practiced by CAHWs and CAHW associations are categorized as illegal, and should be handled only by qualified and registered veterinarians. For instance, the Veterinary Surgeons Act provides several sections that exclude CAHWs and do not reflect realities on the ground, e.g.:

- Section 5: Restricts registration for veterinary practice to holders of degrees and diplomas in veterinary science from universities recognized by the Uganda Veterinary Board;
- Section 13: Criminalizes practice by unregistered or unlicensed persons;
- Section 14: Denies unregistered persons legitimacy to lay claim to payment for a service delivered in veterinary practice;
- Section 24: Reads, “Nothing in this Act shall be deemed to prohibit or prevent the practice of veterinary surgery by any person in the service of the Government.” This lacks clarity about whether veterinarians in public service may also practice privately, and full-time private veterinary practitioners see this confusion as a major concern. Not least, they see unfair competition for private work from government employees, with private practices that are indirectly subsidized through a salary and the provision of private services during public working hours.

As indicated above, the government retains full control of vaccination (except Newcastle disease in poultry).

3.7.5 Summary of constraints and challenges

The constraints and challenges limiting the effectiveness and sustainability of animal health service delivery mentioned by key service providers and suggested solutions to improve service delivery are summarized in Table 11.

Table 11. Challenges and constraints mentioned by major service providers in Karamoja

CAHWs	Veterinary pharmacies/Drug shops
<ul style="list-style-type: none"> • Legislative and regulatory prerequisite of privatization • Lack of access to veterinary drugs and other supplies • Training issues • Free provision of goods and services • Livestock keepers unwilling to pay for services, complain about high prices of drugs, and believe that the CAHWs get drugs for free from NGOs • Some livestock owners demand service provision on credit and refuse to pay if the animals do not recover • Inadequate technical support and refresher training • Inability to restock drugs because of declining capital • Most livestock owners treat own livestock • Delay in payment for vaccination services • No certificate after training • Challenge to respond to new diseases 	<ul style="list-style-type: none"> • Shortage of capital for bulk stocking and lack of credit services • High operation costs (e.g., rental and transport to restock drugs from Kampala) • Unwillingness of companies to deliver supplies worth less than UGX5 million (\$1,500) • Competition from public veterinarians, whereby civil servants are also practicing privately on the side • Occasional free drug distribution by NGOs • Lack of clear demarcation or confusion between public and private veterinary services (e.g., private sector was not involved in vaccination campaign supported by NGOs) • Seasonality of drug demand • Unfair competition from unlicensed and illegal drug suppliers because of failure of NDA to supervise and enforce legislation and policy • Lack of cold chain facility to stock vaccines, notably for Newcastle, which has a good demand • NGOs were not involving private veterinarians in the training of CAHWs • High illiteracy levels of CAHWs
Local government (DVO)	NDA/DADI
<ul style="list-style-type: none"> • Lack of transport and budget to supervise CAHWs and to undertake surveillance and vaccination • DVO relies almost entirely on support from NGOs to execute their activities (e.g., vaccination and disease surveillance) • Lack of coordination among different actors • Some NGOs are not involved in planning and implementation of their activities • Inadequate vaccines and other veterinary supplies • Shortage of manpower • High illiteracy levels of CAHWs 	<ul style="list-style-type: none"> • Lack of means of transport and budgetary support to monitor and prevent illegal drug dealers • Inadequate staff level • Lack of commitment from law enforcement authorities to take action against illegal operators

4. CONCLUSION AND RECOMMENDATIONS

This review of animal health service delivery in Karamoja sub-region involved a comprehensive review of the literature, and the use of interviews and participatory methods with a wide range of key informants, including livestock owners, veterinarians, veterinary paraprofessionals, and drug shop operators. The review covered all seven districts of Karamoja sub-region and aimed to cover all aspects of animal health services, drawing on concepts of system thinking. This includes curative and preventive services, drug and vaccine supply, public and private sector service providers, and various institutional and coordination issues.

In general, preventive and clinical animal health services in Karamoja were not efficient or effective at reducing disease impacts on livestock and related livelihoods impacts. Specific conclusions and recommendations are summarized below.

4.1 CLINICAL SERVICES

4.1.1 Drug supply

Constraints

- Weaknesses in the supply of veterinary medicines were evident in all business models, often associated with insufficient capital to buy drugs in bulk from Kampala. There was limited capacity to distribute drugs from urban to rural areas via a chain of local private operators, i.e. PVP store to AHO/AHT or CAHW association to CAHWs. The importers and drug retailers based in Kampala were not interested in delivering orders to Karamoja of a value less than UGX5 million (\$1,500).

Suggestion for improvement

- Examine and test options for strengthening business relationships between central drug suppliers and PVPs; e.g. support central drug suppliers to establish direct ties to PVPs in Karamoja, either directly or through one or more local distributors. The central suppliers could either provide credit terms for stocked inventory or reduce the threshold for direct sales. Note that a constraint for distributors is that a licensed pharmacist must be on site (for the NDA registration), and this cost is prohibitive.

4.1.2 Drug quality

Constraints

- Concerns over the quality of veterinary medicines were raised due to importation of drugs from Kenya. However, these concerns were mainly anecdotal, and no systematic information or laboratory assessments of drug quality were available.

Suggested action

- Research is needed to better understand the quality of veterinary medicines available in Karamoja and should include laboratory testing of products suspected to be of low quality.

4.1.3 Gaps in legislation and policy enforcement and clarity

Constraints

- Private sector actors raised concerns that government and NGO veterinarians were involved in private practice, and untrained and illegal drug retailers were operating widely. Although the existing privatization policy was clear about nonprofessional involvement in private practice, the inability to enforce the policy was a major challenge. Neither the Veterinary Surgeons Act nor the National Drug Policy prohibits veterinarians employed by government or NGOs from also working privately. This can create clear conflicts of interest, as well as unfair competition. For example, if a DVO has a role in monitoring private sector activities while also operating a private practice, there is a conflict of interest. Similarly, if vaccination services were to be contracted out to the private sector, further conflicts of interest could arise.
- A further policy constraint relates to the NDA condition for high-volume PVPs to have a pharmacist on site, which is expensive and not necessary if a veterinarian is present.

Suggestions for improvement

- Public sector veterinary and veterinary paraprofessionals should be involved in regulatory activities and veterinary tasks, with a clear public good nature.

- Despite punishment through fines and confiscation of drugs, illegal drug retailers re-establish themselves and continue to operate as long as there are gaps in drug supply through other mechanisms. Rather than continuing to position these actors as illegal, it may be better to integrate them into the system through training and some form of licensing or accreditation. Because they move extensively between markets in the region, they could be suitable agents to increase drug distribution and improve advice on drug usage.
- Work with national veterinary bodies and NDA to customize regulations for the animal industry; e.g. remove the need for PVPs to employ a pharmacist.

4.1.4 Involving private veterinarians in CAHW training

Constraints

- Private veterinarians, where present, should be an essential part of a private delivery system involving CAHWs. However, CAHWs were trained by NGOs in collaboration with government veterinarians, with limited involvement of private veterinarians. This has led to mutual mistrust and competition, rather than the private veterinarians complementing the work of CAHWs and vice versa.

Suggestions for improvement

- A model of private veterinarian-AHO-CAHW is a key strategy to improve the quality and coverage of veterinary service delivery. One of the easiest ways to support this model is to involve private veterinarians and AHOs in the training of CAHWs, starting from the initial community dialogue and selection of trainees. This will create strong linkages not only for drug supply, but also for supervision and technical support. All actors in the model share not only a professional responsibility, but also a common goal of maintaining a viable business. As one private veterinarian explained, “Maintaining and improving the knowledge and skill of CAHWs through regular technical advice enhances the economic viability of business, because as the quality of CAHWs service improves our customers increase and thus, drug turnover.”

4.2 DISEASE CONTROL STRATEGIES AND VETERINARY PRIVATIZATION

4.2.1 Decentralization of TAD control

Constraint

- Among central actors, poor disease control in Karamoja was largely attributed to decentralization and the transfer of responsibility for disease control from central to local government. At the same time, centralizing disease control was strongly opposed by local officials. For TADs, which by definition can spread across different regions of Uganda or across international borders, national disease control strategies are needed based on a sound understanding of the epidemiology and economics of each disease, and analysis of the economic and social feasibility of different control options. Similarly, surveillance and control need strong central management, as well as the authority to liaise with neighboring countries and international disease control bodies and programs. TAD control in Karamoja is unlikely to be effective if the responsibility is delegated to local government. Specific aspects of TAD control, such as vaccination in response to outbreaks and movement restrictions, seem not to affect the frequency or severity of disease outbreaks.

Suggestions for improvement

- Support a review of the responsibilities for the control of TADs in Uganda by reference to decentralization and the effectiveness and impacts of current strategies by disease. Support stakeholder analysis of alternative strategies by disease, against indicators that include economic, technical, and social feasibility.
- See section 4.2.2 for further suggestions for improvement.

4.2.2 Vaccination by the private sector

Constraint

- Government vaccination activities rely heavily on FAO funding and are highly appreciated by local government. However, current vaccination strategies are ineffective at preventing disease outbreaks, and they exclude the private sector. The control of some diseases for which vaccines are available is a private good, indicating that vaccine supply and administration are tasks for the private sector and would enhance the viability of PVPs. The control of other diseases is a public good, but the private sector could be contracted out to provide these services—again, enhancing PVPs.

Suggestion

- There should be a clear categorization of diseases as public, private, or mixed goods, along with the review of TAD control strategies under section 4.2.1. For disease control that is a private good, the private sector should be involved in the delivery of vaccination services. For public goods, such as TAD control, pilot contracting-out arrangements should be used. There needs to be a clear exit strategy away from reliance on FAO for vaccination.

4.2.3 Control strategies—other diseases**Constraint**

- Overall, current disease control strategies are not reducing disease impacts. These strategies are guided by the Disease Control Act, introduced in early 1960s, which largely focuses on the eradication or control of disease vectors, quarantine, slaughtering, and movement restrictions enforced by government.

Suggestion

- Disease control strategies need to be updated based on the epidemiology and economics of disease, analysis of the public vs. private good nature of different diseases, and assessment of who benefits from disease control and therefore, who should contribute to costs. The analysis also needs to examine the relative strengths and weaknesses of the public and private sector for handling specific disease control tasks, by disease, and options for public-private partnerships.
- A simple example is the control of anthrax and blackleg, which should be controlled using preventive vaccination via the private sector rather than ineffective response vaccination by government.

4.2.4 Public-private partnerships: Control of ticks and TBDs**Constraint**

- Tick infestation and TBDs are important disease constraints in Karamoja, and tick control is viewed as ineffective. There is no clear strategy for the control of TBDs, although this is a complex topic that needs an understanding of the epidemiology of different TBDs, including ECF, babesiosis, anaplasmosis, and heartwater. Government was responsible for the control of ticks and TBDs before privatization. Dipping and mass spraying was used

previously and was seen as effective. However, these are expensive options and require strong technical support to define appropriate acaricides and monitor acaricide resistance and environmental contamination.

Suggestion

- Support stakeholder analysis of tick control options for Karamoja against a range of technical, economic, and other criteria. Expose stakeholders to alternative approaches such as the use of vaccination to control ECF and assess the feasibility of public-private partnerships for tick control where relevant. Pilot and evaluate tick control approaches.

4.3 STRENGTHENING CAHW SYSTEMS**4.3.1 Recognition of CAHWs as an animal health service provider****Constraints**

- CAHWs operate informally, and legislation and policies such as the Veterinary Surgeons Act, 1964, The National Drug Policy and Authority Statute, 1993, and the National Veterinary Drug Policy issued by MAAIF in 2002 do not recognize CAHWs as a provider of any aspect of animal health services. The failure to formally recognize CAHWs creates risks for any actor who wishes to work with them, even government DVOs who use CAHWs for vaccination. At present, CAHWs are illegal workers and under the law are not supposed to receive payment for their services. The current status of CAHWs also prevents their adequate monitoring and technical support using any kind of official guideline.

Suggestions

- *Recognition of CAHWs:* As the relevant statutory body, the Uganda Veterinary Board, in collaboration with Karamoja Livestock Development Forum and other stakeholders in Karamoja, should review the roles and responsibilities of CAHWs based on the local context, and facilitate the legal recognition of CAHWs as service providers.
- *Quality assurance and control mechanisms:* The official recognition of the CAHWs should be accompanied by quality assurance and control mechanisms appropriate to local context. This may include defining the roles and responsibilities of CAHWs, and assigning a specific desk or unit within DVOs to ensure the quality of CAHWs programs.

4.3.2 Effectiveness and sustainability of CAHWs

Constraints

- Although CAHWs have considerable potential to improve basic clinical veterinary care in Karamoja, there is a widespread perception among veterinarians that the limited capacity of CAHWs relates to their low literacy. In addition, the few training reports that were available have identified illiteracy as one of the constraints encountered during the training activities. However, these views are not consistent with evidence from many other pastoralist areas of Africa, where illiterate individuals were trained as CAHWs and proved to be effective (e.g. Catley et al., 2004; Abebe, 2005). CAHW training courses varied between implementers in terms of course content and design, and implementers were often not using good CAHW training practices (Iles, 2002a; 2002b; AU/IBAR, 2003).

Suggestions for improvement

- Improve the quality of CAHW training by reference to good practices, and appropriate material and training methods for illiterate trainees (Iles, 2002a; 2002b; AU/IBAR, 2003). Raise awareness of good practices for CAHW training among NGO and government actors, and support a standardized CAHW training approach, with flexibility to account for location-specific variations in diseases.
- *Develop and enforce Minimum Standards and Guidelines for the Design and Establishment of Sustainable Community-based Animal Health Service in Karamoja sub-region, endorsed and enforced by a statutory body.* The preparation and review of training curriculums for veterinary education and training is the mandate of the Uganda Veterinary Board. The preparation of a CAHW training manual is underway by the College of Veterinary Medicine, Makerere University, and this will need to comprise two components (Catley et al., 2004):
 - Essential knowledge and skills required by all CAHWs, regardless of their location;
 - Area-specific knowledge and skills according to priority needs in different ecological zones and livestock production systems. For instance, in Karamoja, the challenge of trypanosomiasis is more severe in areas in Kaabong and Kotido close to Kidepo Valley and in Amudat. Existing training manuals did not consider area-specific differences in disease occurrence.

It is worth noting that the training curriculum is just one component of the design and implementation of an effective CAHW training course. Appropriate candidates need to be selected, and the trainers need to be well trained in participative training techniques (see below) as a separate activity.

- *Develop and enforce training of trainers (ToT) manual for the training of CAHWs:* The perception that any veterinarian can train CAHWs is one of major weaknesses of projects in Karamoja. While the initial involvement of government veterinarians is a strong aspect of CAHW projects, trainers of CAHWs need specialist skills in participative training techniques if they are to deliver effective training to illiterate trainees (Iles, 2002b; AU/IBAR, 2003).

4.3.3 Collaboration and coordination

Constraint

- Collaboration and coordination between implementers of CAHW projects and government is a critical component in the success of the CAHW system. Duplication and overlap of activities identified by stakeholders clearly reflects the presence of gaps in collaboration and coordination of activities. For example, the distribution of CAHWs clustered around centers of sub-counties and along major roads indicates clearly an overlap of trainings in the same areas. This is also reflected in refresher trainings, whereby some CAHWs have received refresher courses several times, while others have never received any refresher courses since their initial training. Strong coordination enables the use of good practices, which should be applied consistently across CAHW projects. These good practices include initial community dialogue, CAHW selection, involvement of the private sector for training, drug supply, and technical support, training of trainers in participative training techniques, CAHW training using participative training techniques, and CAHW monitoring and evaluation.

Suggestion for improvement

- Government-led coordination of all livestock development actors involved in veterinary service delivery should be organized regularly at district level. These coordination platforms need to be linked to the sub-regional/central Karamoja livestock development forum.

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ANNEX I. METHODS

The review of the animal health delivery system in Karamoja will be based on three main approaches: a literature review, interviews of stakeholders at different levels, and a workshop.

- 1. Literature review:** A literature review will be conducted, focusing on documents produced before and after independence. The documents will include published and unpublished material, including, where available:
 - Government veterinary regulations, policy, and strategy frameworks;
 - Government and NGOs animal health project documents focusing on the Karamoja region: proposals, CAHWs training curriculums, and monitoring, evaluation, and impact assessment reports;
 - Impact assessments and best practice guidelines on CAHW initiatives in other pastoral areas in the region.
- 2. Interviews of stakeholders:** This includes interviews of representatives of government veterinary services at national and district levels, non-governmental organizations (NGOs) operating in Karamoja region, private veterinary service actors, community members, and Community Animal Health Workers (CAHWs).

Government

Information	Question	Source of information
1. Trends in government veterinary service delivery		
Historical account of veterinary service delivery	<ul style="list-style-type: none"> • When, how, and who started the veterinary service? • What kinds of services (e.g., treatment, vaccination, etc.) are provided • Staffing, logistics, and budget allocation • What were the changes over time in approach and policy, e.g., start of vet privatization policy? 	<ul style="list-style-type: none"> • District Veterinary Offices • Representatives of other institutions (e.g., FAO, NGOs) • Others
Present institutional capacity	<ul style="list-style-type: none"> • What kinds of services (e.g., treatment, vaccination, etc.) are provided? • Staffing, logistics, and budgetary allocation • Adequacy and flow of veterinary supplies • If capacities increased/decreased, what were the reasons? • Strategies for improving clinical veterinary services, for instance: <ul style="list-style-type: none"> - Use of CAHWs in different animal health activities (e.g., vaccination campaign, disease surveillance, etc.) - Cost recovery/pricing approach for provision of clinical services - Approach used during drought, e.g., free treatment or vaccination 	<ul style="list-style-type: none"> • Directors of Veterinary Services • District Veterinary Offices • Representatives of other institutions (e.g., FAO, NGOs) • Others

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2. Trends of legal framework, policy, and strategies provided by government

Veterinary service delivery	<ul style="list-style-type: none"> Centralization vis-à-vis decentralization of the government veterinary service Involvement of the private sector in clinical service delivery—perceived advantages and disadvantages Roles and responsibilities of different actors by: <ul style="list-style-type: none"> Institution (such as government, NGOs, CBOs/farmers field schools, etc.) Qualification (such as veterinarian, animal health assistant, paraprofessional, etc.). 	<ul style="list-style-type: none"> Directors of Veterinary Services District Veterinary Offices NGOs Others
Opportunities and needs for the future	What are the options for strengthening clinical veterinary service delivery going forward and why?	

Non-governmental organizations (NGOs)

Information		Source of information and methods
Information	Name of the NGO	Direct questioning of NGO
Background about the CAHWs program	<ul style="list-style-type: none"> What is the role of the organization in animal health service delivery? How did they implement their programs (directly or through support to government/CBOs/local and international NGOs)? When did they start implementing the program/project? Did they implement a CAHWs program? 	Direct questioning of the NGO staff; review of project documents such as proposals/evaluation reports
CAHWs initial training	<ul style="list-style-type: none"> Number of batches trained Numbers trained (male/female) Duration of initial training Knowledge and skills included in the training Who was the trainer (vet/AHA/other)? Training methodology (i.e., the use of participator training approach) Kits provided: types and quantity of medicine and equipment 	Review of documents including: <ul style="list-style-type: none"> Project proposal CAHWs training manual CAHWs training reports CAHWs project monitoring and evaluation reports
Technical support	<ul style="list-style-type: none"> Refresher trainings provided, frequency and intervals On-job monitoring: <ul style="list-style-type: none"> How frequently done Who does it: vet/AHA of government/NGO 	
Sustainability issues	<ul style="list-style-type: none"> Pricing of services and medicines Cost recovery mechanisms Links with private sector for input supply Exit strategies Links with DVOs for surveillance or other tasks 	
Opportunities and needs for the future	What are the options for strengthening clinical veterinary service delivery going forward and why?	

Private veterinary service actors

- Identify private sector actors (such clinical service providers, veterinary medicine importers, distributors, and dispensers (pharmacy)).
- What are the dynamics in number and capacity of the actors over time?
- What are the constraining and enabling factors (this may include policy environment, financial capacity, etc. Include questions on whether the plethora of NGOs is seen as a problem).
- How does the medicine reach the livestock herder from the private sector (e.g., directly or indirectly via the CAHWs, etc.)?

Community members

Methods: Focus group discussion with follow-up exploratory and probing questions as necessary

Timelines events

Focus group informants were asked to describe key social, ecological, and livestock-related events that were an impediment to their livelihood and socio-ecological system since independence.

Key questions/actions:

- Identify key events (i.e., social, economic, and natural) that affected the community since 1960. These may include:
 - Political events (e.g., changes in government, elections);
 - Periods of conflict (e.g., cross-border with other ethnic groups or between government and the Lord's Resistance Army);
 - Drought or disease epidemics.
- Observation periods were divided based on regimes: pre-colonial, Obote 1, Amin, Obote 2, and Museveni periods. The periods were used as milestones to facilitate recall of animal health-related issues and other events that happened.
- Then the informants were asked specifically about animal health-related events/issues chronologically at different levels of the time scale. The key probing questions included (but were not limited to):
 - What were the major animal health problems by species?
 - Where did they get veterinary services—from traditional/government/NGOs/CAHWs/ private vet/others?

Diseases impact change: Before and after scoring: Changes in disease impact were measured as follows (also see Leyland et al., 2014; Abebe, 2005):

- Focus group informants were first asked to describe the impacts of diseases on livestock and household livelihood.
- Using the disease impacts identified, the participants were asked to identify major livestock diseases in cattle, sheep, and goats that were perceived to cause high impact. Local names and descriptions were used to identify diseases.
- Ten stones were assigned to each of the named diseases to represent the impact of that disease before the year 2000.
- Taking each disease in turn, informants were then asked to reduce, increase, or leave the pile of 10 stones to show the impact of the disease “now,” now being some years after CAHW activities started. Therefore, informants could remove stones from the pile, add stones (to cater for stones being added, an extra 10 stones were kept to one side), or leave the pile unchanged. Informant groups were asked to discuss the task amongst themselves and, as a group, decide how they wished to apportion the stones.
- After consensus was reached on scoring, informants were asked to explain the reasoning behind their scores. Some of the diseases may be new and CAHWs were not trained to handle them, others may not have medicines/vaccines or the medicines or vaccines were insufficient.

Matrix scoring of the effectiveness and sustainability of veterinary service providers

The effectiveness and sustainability of veterinary service providers were measured based on indicators of accessibility, availability, affordability, acceptance, and quality based on a step-by-step approach as follows (also see Leyland et al., 2014; Abebe, 2005):

- Focus group informants were asked to identify veterinary service providers in their area.
- Each service provider was represented using locally available material or a drawing on paper.
- A matrix of 5 by 7 was drawn on the ground whereby indicators representing accessibility, availability, affordability, acceptance, and quality were put vertically and the service providers were put horizontally, as illustrated in the table below.
- Fifty stones of equivalent size and shape were used per indicator.
- The exercise was explained to the informant group. The relative importance of each service provider against each indicator would be differentiated by dividing the stones under each indicator across the service providers. Larger piles of stones represent high scores, indicating a strong association and a low score for a weak association.
- After confirming understanding, the informants were asked to select one person to do the exercise. The others provided comment and argument until consensus was reached before moving on to the next indicator.
- After all the indicators were scored, the scores were recorded in a notebook, and then there was a discussion about the reasoning for a high or low score for each indicator per service provider.

Indicators	Gov. vet	Private					
		PVP	CAHWA drug shop	AHO	CAHW	Backpack drug trader	Traditional healer
ACCESSIBILITY • This service is close to us.							
AVAILABILITY • This service is available always when needed. • This service has all the medicines needed.							
AFFORDABILITY • This service provider is less expensive. • There is willingness to pay for a high-quality service provider.							
QUALITY • More animals usually recover with this provider. • This provider offers more services. • The medicine from this provider is always effective.							
ACCEPTABILITY We trust this service provider.							

(Source: adapted from Leyland et al., 2014)

Community animal health workers

Information required	Questions	Methods
Background about the CAHW	<ul style="list-style-type: none"> Name of the CAHW When did he/she start working as CAHW (first training month and year)? Who trained him/her? How long was the first training? Any additional or follow-up training provided? 	Semi-structured interview
Range of activities/ services provided	What are the services that the CAHW was able to provide, such as diseases they treat or provide vaccination for, castration, etc.? (Disease and services were identified by local names.)	Semi-structured interview
Disease diagnosis	What are the clinical signs and transmission of five livestock diseases identified above or covered in the CAHW training?	Semi-structured interview
Use of veterinary medicines	<ul style="list-style-type: none"> What is the dose and route of administration of medicines/vaccines for five diseases per livestock species and size? How are the medicines handled/stored, and what are the expiry dates? What are the contents of the CAHWs kit? 	Semi-structured interview/ Direct observation
Medicine supply	<ul style="list-style-type: none"> How do you replenish medicines? <ul style="list-style-type: none"> Private veterinary pharmacy/NGO/gov./others How satisfied is the CAHW with the stock provider? <ul style="list-style-type: none"> Availability/accessibility/affordability/quality of medicines 	Semi-structured interview/ Simple ranking
Technical supervision	<ul style="list-style-type: none"> Do you get technical support from vets or other veterinary paraprofessionals? If yes, from whom (organization) and how frequently? What do you do when you encounter a disease that you are not trained to handle? 	Semi-structured interview
Challenges of CAHW work	Direct questioning on the disadvantages and challenges of CAHW work	Semi-structured interview
Opportunities and needs	Direct questioning to gather CAHW views on future opportunities and needs	Semi-structured interview

3. Workshop

At the end on the data collection, a one-day workshop was organized in Moroto. All stakeholders involved in veterinary service delivery in Karamoja were invited. The key issues addressed at the workshop were:

- Understanding the history and development of vet services in the region, including introduction of CAHWs and private sector;
- Building consensus on the present status of veterinary service delivery in Karamoja;
- Jointly identifying key constraints and making suggestions for overcoming these constraints going forward.

Community Animal Health Workers

- **Measures of appropriateness of design and implementation of CAHWs system**

The design and implementation of CAHWs in general was assessed based on measures of the key indicators listed in the table below, drawn from observations and assessments of several experiences in the region and elsewhere (for details, see Iles, 2002a and Catley, 2002).

Indicators of appropriate CAHW training program

1. Initial training

- **Trainer**
 - ✓ Academic qualification (Vet/APO/AHA)
 - ✓ Qualified as trainer of CAHWs (training on participatory training technique)
 - ✓ Speaks local language or uses translator
- **Design of the training course**
 - ❖ Has training need assessment been carried out?
 - ❖ Selection of CAHW trainees
 - ❖ Training course content and lesson plan
 - ❖ Who decided specific disease types included in the course and how did they decide?
 - ❖ The use of local names and descriptions of diseases and other local knowledge
- **Facilitation of training course**
 - ✓ No. of trainers vs. trainees
 - ✓ The use of translator (yes/no)
 - ✓ The use of participative training techniques (such as Q&A, brainstorming, role play, etc.)
 - ✓ The use of participatory training aids (such as live animals, post-mortem examinations, specimens, picture codes, illustration pictures, photos, etc.)
 - ✓ Practical sessions:
 - ❖ Clinical examination of cases
 - ❖ Treatment/vaccination: linking drug/vaccine with disease; dosage; route of administration and technique
 - ❖ Cleaning and handling equipment
 - ❖ Keeping records
 - ✓ Assessment and recognition of the trainee
 - ✓ Duration of the training: two weeks is recommended
 - ✓ Location of the training: should be within the natural environment within the village
 - ✓ Starter kit items and other equipment related to knowledge and skills covered in the training

2. Post-training activities

- **Post-training supervision**
 - ✓ How long after the training
 - ✓ By whom
 - ✓ Indicators and methods of assessment used
- **Routine supervision of CAHWs activities**
 - ✓ Frequency
 - ✓ Qualification and expertise of supervisor
 - ✓ Indicators and methods of assessment used
 - ✓ Community involvement (who and how)
- **Refresher course**
 - ✓ Frequency
 - ✓ Duration
 - ✓ Knowledge and skills reviewed and/or added
 - ✓ Qualification and expertise of trainer

ANNEX 2. TIMELINE OF EVENTS SHAPING KARAMOJA SINCE INDEPENDENCE

Regime/ Year	National	Karamoja
1962	Independence of Uganda Establishment of the Kidepo Valley National Park	<ul style="list-style-type: none"> • Karamoja District Administration Office opened by Obote 1, putting the region under the control of the central government • Tsetse control using aircraft spray in Kaabong District, particularly in Kidepo sub-county, causing widespread mortality of birds, snakes, and dryness of tree leaves • Mass vaccination against <i>louko</i> (CBPP) carried out for the first time in Kaabong. Focus group informant in Lolelia sub-county recalled the veterinarian who vaccinated their animals was known as Ayellaa. The place where the vaccination was conducted is named “Louko” since then.
1964		Conflict and raiding: The Bokora attempted to raid the Jie but not only failed but lost most of their prominent warriors.
1966/67		The Bokora, Matheniko, and Pian alliance: After the Bokora were defeated by the Jie (see above), they mobilized with the Matheniko and Pian, and carried out consecutive attacks on and raided livestock from Jie in a place called Kalomariapus and Turkana in Rikinei. Although they also attempted to raid the Pokot, they were not successful and were defeated at a place called Dwarakile.
1968/69		The Turkana and Jie alliance: The alliance attacked and raided the Matheniko in Mogos sub-county, the Bokora in Lopai sub-county, and the Nyagkwae people in Abim. The conflict has also led to displacement of the latter ethnic group, who have settled in Napak since then.
1971	Obote was overthrown by Idi Amin Dada in a military <i>coup d'état</i> .	
1971/72		The Bokora–Pian–Matheniko conflict: Disagreement between the Bokora and Pian occurred because of members of the latter stole cattle from the former. In an attempt to revenge the Pian, the Bokora raided the Matheniko <i>kraal</i> by mistake. Although the Bokora realized the mistake, they failed to apologize and return the animals to Matheniko, causing a disappointment to the latter.

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ANNEX 2. TIMELINE OF EVENTS SHAPING KARAMOJA SINCE INDEPENDENCE

Regime/ Year	National	Karamoja
1973		<ul style="list-style-type: none"> • The Matheniko and Turkana alliance: The Matheniko sought and formed an alliance with Turkana on the condition that they help the Turkana to raid other Karamojong ethnic groups. The deal was made in Lokriama in Turkana, Kenya. • More than 250 members of the Bokora were killed by Idi Amin's soldiers for refusing to abandon outlawed traditional clothing in favor of the "modern" dress code.
1974–79		Matheniko and Turkana jointly carried out several attacks and raids against Karamojong and other ethnic groups.
1979	The overthrow of Idi Amin <i>Dada</i> in a military <i>coup</i>	Following the overthrow of Amin, the military barracks in Moroto were abandoned, and the Matheniko clans used the opportunity to loot a lot of modern automatic guns and ammunition.
1980	Election of Milton Obote into power	<ul style="list-style-type: none"> • Conflict: The heavily armed Matheniko clan attacked and raided the Bokora, Pian, and Dodoth ethnic groups. • Drought and famine: These coincided with raiding. Drought caused displacement of the Bokora, Pian, and Dodoth communities. • The return of Apaloris, a prominent Matheniko <i>kraal</i> leader, from Turkana.
1982		Matheniko–Tesso conflict: Large groups from the Matheniko community led by Apaloris migrated to Tesso District for grazing. They were, however, not welcomed and were attacked by local militia, resulting in arrest and subsequent killing of the Matheniko <i>kraal</i> leaders.
1985	Obote 2 regime removed by <i>coup</i> led by Tito Okello Lutwa	Matheniko revenge over the Tesso: The Matheniko have continuously attacked and raided Tesso, Acholi, and other neighboring ethnic communities in revenge.
1986	Overthrow of Tito and Museveni takeover of power	
1987	Structural Adjustment Program (SAP)	<ul style="list-style-type: none"> • Weakening of the government veterinary services delivery • Mass killing of the army by Karamojong warriors
1989–94		Matheniko attack of Bokora: The Matheniko declared war in an attempt to raid Bokora twice, but they were defeated in both events at a place known as Matakul.

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Regime/ Year	National	Karamoja
1991		Rinderpest outbreak in different areas
1992	Uganda Trypanosomiasis Control Council Act	Rinderpest outbreak continued in different areas
1993	National Drug Policy and Authority Statute Act ¹	<ul style="list-style-type: none"> Rinderpest outbreak continued in different areas PARC-Uganda trained 42 CAHWs from different districts and were involved in rinderpest vaccination
1994		<ul style="list-style-type: none"> Oxfam supported construction of crushes in Kaabong Government became involved and attempted to establish community militia involving the warriors themselves to prevent conflict.
1995	Parliament enacted Decentralisation Statute No. 15	Oxfam trained 16 CAHWs in Dodoth County, Kaabong.
1996		Christian Veterinary Mission (CVM) trained CAHWs in Kotido and Moroto Districts.
1997	<ul style="list-style-type: none"> Local Government Act Decentralization of governance and administrative system from the center to local government 	<ul style="list-style-type: none"> Veterinary service rapidly declined because of weak institutional and technical capacity of DVO to implement the responsibility for disease, which devolved from central MAAIF to local government.
1998		<ul style="list-style-type: none"> CAHWs Training of Trainers facilitated by CVM for NGO staff The Karamoja Veterinary Laboratory established by Italian Institute for International Cooperation and Development (C&D) in Moroto
1999		<ul style="list-style-type: none"> Karamoja regional veterinary laboratory established by C&D Happy Cow Project opened the first drug shop in Kotido town and in Nabilatuk trading center in Nakapiripirit District The Bokora attacked the Matheniko in an attempt at raiding, but they were not successful and were defeated in a place called Moruariwon.

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¹ <http://www.ulii.org/ug/legislation/consolidated-act/206>.

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ANNEX 2. TIMELINE OF EVENTS SHAPING KARAMOJA SINCE INDEPENDENCE

Regime/ Year	National	Karamoja
2000		<ul style="list-style-type: none"> Government launched voluntary disarmament, facilitated by UPDF.
2002	The National Veterinary Drug Policy	<ul style="list-style-type: none"> UPDF continued voluntary disarmament in exchange for maize, ox ploughs, etc. as incentives to encourage the community to come forward and hand in their guns.
2003		<ul style="list-style-type: none"> Disarmament interrupted because of Lord's Resistance Army (LRA) attack, which required the UPDF involved in disarmament to respond, halting the disarmament. At the same time, the Bokora and Dodoth, who were already disarmed, were attacked and raided by the Jie and Matheniko, who were not disarmed then. This led to a massive rearming of the Bokora and Dodoth.
2004		<ul style="list-style-type: none"> Disarmament resumed, but communities were resistant, fearing attack and raiding by enemies.
2005	Karamoja Integrated Disarmament and Development Programme (KIDDP) started by government with the aim of promoting human security and recovery in Karamoja	<ul style="list-style-type: none"> UPDF introduced forceful disarmament measures, including house-to-house, cordon and search tactics, and protected cattle <i>kraal</i> management to confine the livestock in a restricted place. High ranking UPDF officer killed with other 15 soldiers in Kotido by Karamoja warriors
2006	Draft Veterinary and Para-Veterinary Practitioners Bill presented to the Parliament but not endorsed so far	<ul style="list-style-type: none"> Forced disarmament continued. The first outbreak of PPR in Karamoja was reported from Kotido District by private vet, based on information from livestock owner from Napcet village of Lopuyo parish, Rengen sub-county.
2007	MAAIF officially reported confirmed outbreak of PPR in Uganda.	<ul style="list-style-type: none"> Forced disarmament continued. Major drought led to crop loss and livestock mortality. PPR outbreak expanded to Kabong District.
2008		<ul style="list-style-type: none"> Mass vaccination carried out against PPR and CBPP by MAAIF, with FAO procuring the vaccine and paying for logistics PPR outbreak reported.

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Regime/ Year	National	Karamoja
2009		<ul style="list-style-type: none"> Peace agreement reached between Jie, Bokora, Matheniko, and Turkana
2010		<ul style="list-style-type: none"> A new wave of PPR outbreak observed in almost all districts Major cattle raid by Jie against Dodoth in Kaabong
2011		<ul style="list-style-type: none"> Livestock tracking chips introduced in Kapedo District, Kaabong The US Air Force, in collaboration with UPDF and MAAIF, conducted a CAHW refresher training in Kaabong and carried out mass treatment and vaccination free of charge for two weeks.
2012		<ul style="list-style-type: none"> Peace agreement reached between Dodoth, Jie, and Turkana More than 5,000 Turkana pastoralists crossed the border into Kotido and Kaabong Districts with their livestock for grazing and water, escaping the severe drought in Turkana.
2013		<ul style="list-style-type: none"> <i>Lokosogwa</i>, a fly causing <i>plis</i> (trypanosomosis), is observed in Amudat. The problem is new in this area and only observed during the last three years.
2014		<ul style="list-style-type: none"> FMD outbreak in all districts
2015		<ul style="list-style-type: none"> FMD outbreak in southern Karamoja
2016		<ul style="list-style-type: none"> FMD outbreak Tsetse control through mass pour-on spray in Kotido by CAHWs in collaboration with government and private animal health service providers NDA recalls counterfeit drugs, including pox and PPR combined vaccine, from market.

ANNEX 3. CHRONOLOGY OF CAHW TRAINING

Year	Ethnic group/ District	Organization	Type of training	No. trained (No. of training events)	Duration of the training event	Training content and methodologies		Venue
						Theory	Practical (hands-on training)	
1993/94	Regional	PARC	Initial	42 (2)	??	Focused on rinderpest vaccination	??	??
1995	Dodoth/Korido	Oxfam	Initial	16 (1)	2 weeks			??
1996	>>	>>	Refresher	??	??			??
1998/99	Jie/Korido	Happy Cow	Initial	158 (?)	??	<ul style="list-style-type: none"> • Animal husbandry • Diseases of livestock • Veterinary public health skills • Veterinary drugs and equipment • Record keeping and business management • Veterinary legislation, acts, laws • Social issues 		??
>>	Pian	>>	>>	239 (?)	??			??
1999/00	Jie/Korido	>>	>>	53	??			??
>>	Pian	>>	>>	90 (?)	??			??
2000	Jie/Korido	>>	Refresher	36	??			??
>>	Pian	>>	>>	41	??			??
2000/01	Jie/Korido	>>	Initial	85				Residential
>>	Pian	>>	>>	97				Residential
2000/01	Jie/Korido	>>	Refresher	29				Residential
>>	Pian	>>	>>	25				Residential
2001	From all districts	Save the Children	Initial	200 (?)	5 weeks divided in 2 phases of 2 and 3 weeks with 2-week interval in between	N/A		Residential first phase (in Korido town and second phase in Moroto town)
>>	Korido	Oxfam		60				
2002	Kaabong	Happy Cow	Initial	72	1 week	??		Kaabong Council Secondary School

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Year	Ethnic group/ District	Organization	Type of training	No. trained (No. of training events)	Duration of the training event	Training content and methodologies		Venue
						Theory	Practical (hands-on training)	
2003	Kotido	Oxfam	Initial	45				
2004	Kotido	JICA/HWA contracted by Oxfam	Initial	20	??	??		
2005		Oxfam						
2007	Moroto	VSF-Belgium	Initial	20 (1)	2 weeks	??		
>>	Kaabong	Happy Cow	Initial	25	2 weeks	??		Komunkuny Girls School
2008	Kaabong	Oxfam	Refresher	N/A	3 weeks	??		Office of DDA
2009	Kaabong	VSF-Belgium	Initial	12 (1)	2 weeks			
2010	Kaabong	DADO	Initial	40 (1)	2 weeks	??		Office of DADO
>>	Kaabong	DADO	Refresher	N/A	1 week			Office of DADO
2011	Kaabong	Mercy Corps	Refresher	??	1 week	??		Sent Monica Women Club
>>	Kaabong	FAO	Refresher	??	1 week	??		District production office
2013	Kaabong	Mercy Corps	Refresher	??	1 week	<ul style="list-style-type: none"> • Livestock husbandry • Livestock handling • Animal diseases • Public health • Drug administration • HIV/AIDS • Gender mainstreaming • Peace building • Business skills and record keeping 	Class	Sent Monica Women Club

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Year	Ethnic group/ District	Organization	Type of training	No. trained (No. of training events)	Duration of the training event	Training content and methodologies		Venue
						Theory	Practical (hands-on training)	
>>	Kaabong	FAO	Refresher	??	2 weeks	<ul style="list-style-type: none"> • Animal diseases • Drug administration 		DADO office
2015	Kotido, Abim, and Kaabong	Mercy Corps	Refresher	53 (1)	20 days	<ul style="list-style-type: none"> • Livestock husbandry • Livestock handling • Animal diseases • Public health • Drug administration • HIV/AIDS • Gender mainstreaming • Peace building • Business skills and record keeping 		Mercy Corps offices
>>	Kaabong	Mercy Corps	Refresher	20 (1)	3 days	<ul style="list-style-type: none"> • Livestock husbandry • Livestock handling • Animal diseases • Public health • Drug administration • HIV/AIDS • Gender mainstreaming • Peace building • Business skills and record keeping 		Tourist Guest House
>>	Kaabong	Oxfam	Refresher	??	1 week	<ul style="list-style-type: none"> • Gender mainstreaming • Peace building • Business skills and record keeping 		Sent Monica Women Club
2015 (Sept)	Moroto (Nadunget sub-county)	Concern Worldwide	Initial	36 (1)	3 days/ week for 1 month	<ul style="list-style-type: none"> • Animal nutrition and feeding • Livestock breeding • Parasite and 	Injection, deworming, and castration	Nonresidential

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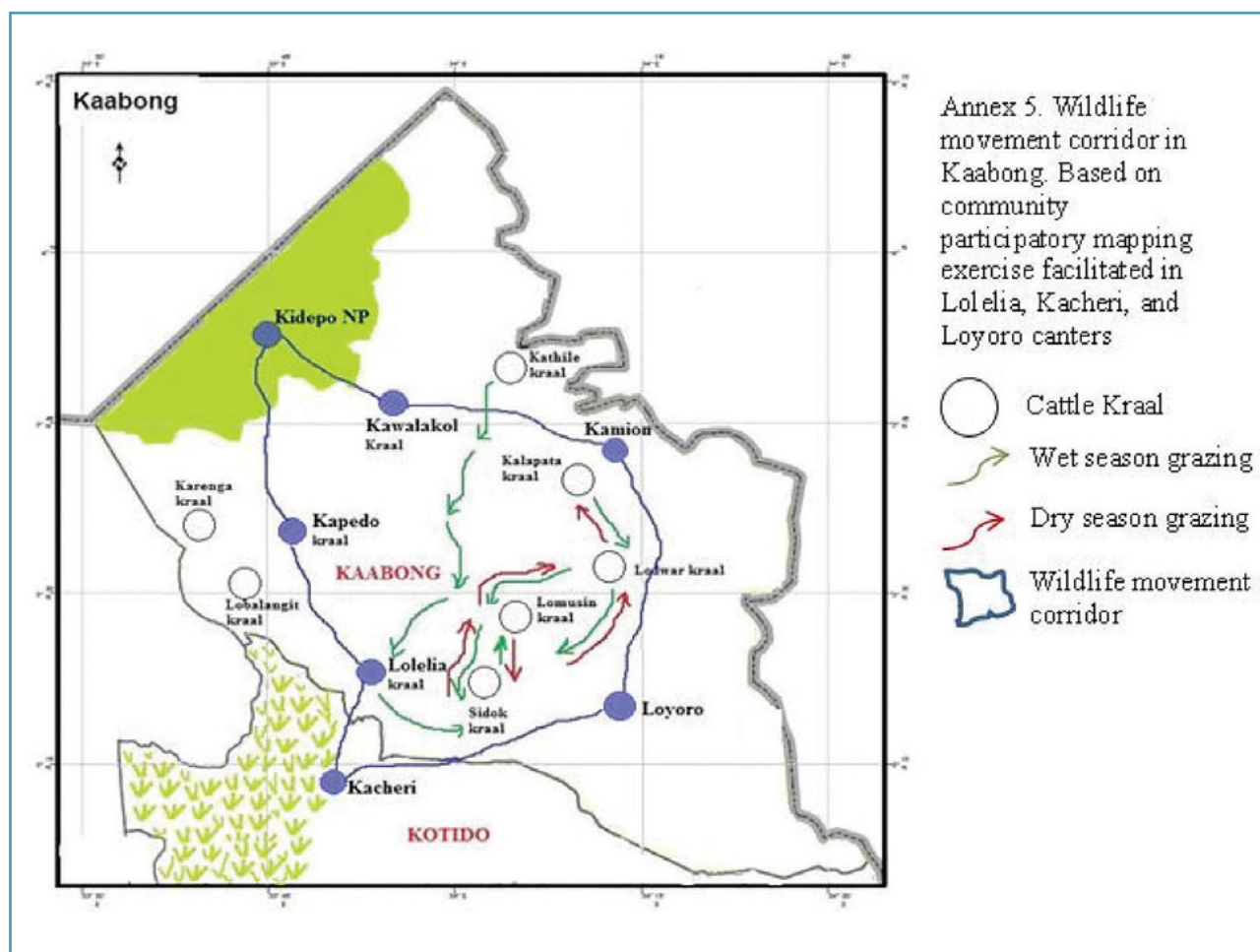
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Year	Ethnic group/ District	Organization	Type of training	No. trained (No. of training events)	Duration of the training event	Training content and methodologies		Venue
						Theory	Practical (hands-on training)	
						disease control • Animal housing • Disease diagnosis and treatment • Vaccination • Referral		
2015 (October)	Napak (Matany sub-county)	Concern Worldwide	Initial	29 (1)				

ANNEX 4. MAJOR DISEASES OF CATTLE AND SMALL RUMINANTS IN KARAMOJA

Local name	Scientific name
Cattle diseases	
<i>Loleeo</i>	Rinderpest
<i>Loukoi</i>	Contagious bovine pluropneumonia (CBPP)
<i>Lokit</i>	East Coast fever (ECF)
<i>Lopid</i>	Anaplasmosis
<i>Lokwat/Kotit/Lokichuma</i>	Blackleg
<i>Lotidae</i>	Anthrax
<i>Ejaa/Lojaa and Ebaibai/Ngorion</i>	Foot and mouth disease (FMD)
<i>Lomany</i>	Liver fluke
<i>Emadang/Singor</i>	Tick infestation
<i>Ediit/Plis</i>	Trypanosomiasis
<i>Lokou/Chemuloi</i>	Heartwater
<i>Lokulam</i>	Babesiosis
<i>Lokethiacan</i>	Brucellosis
Sheep and goat diseases	
<i>Lookot</i>	Contagious caprine pluropneumonia (CCPP)
<i>Emitina</i>	Mange
<i>Loutokonyen/Lolibaring/Losur</i>	Peste des petits ruminants (PPR)
<i>Etom</i>	Pox
<i>Lokou</i>	Heartwater
<i>Loul/Lowal</i>	Bottle jaw (internal parasite)
<i>Ejota/Taltal</i>	Footrot
<i>Emadang</i>	Tick infestation

ANNEX 5. WILDLIFE MOVEMENT CORRIDOR



(Source: Produced based on result of participatory map)

ANNEX 6. SUMMARY INFORMATION ON PRIVATE VETERINARY DRUG RETAILERS

Name of drug shop	Qualification of owner and/or attendant, and legality	Location (year established)	Present status	How the business started	Services provided and customers	Other sources of income	Challenges and constraints
Ekisil	Owner: No professional Attendant: CAHW	Moroto (2008)	Active	<ul style="list-style-type: none"> • Training in and business skills record keeping • Sign board (advertising the business) • Customer and sales record book 	Customers: Livestock owners and often community-based organizations Service: Drug dispensing		<ul style="list-style-type: none"> • High rental cost • Illegal drug distribution
MIONA Veterinary Centre	Owner: Veterinarian Attendant: CAHWs	Moroto (2012)	Active	<ul style="list-style-type: none"> • Opened with drugs granted by International Rescue Committee as start-up stock • Business skills, record keeping, training, and advertising the business • Contracted to provide diagnostic and clinical services 	Customers: <ul style="list-style-type: none"> • Largely livestock owners and a few CAHWs • NGOs (notably Mercy Corps, IRC, and MDF) supplying CAHWs using voucher system Services: <ul style="list-style-type: none"> • Dispense curative drugs • Advise customers on drug usage • Technical services: lab diagnostic and clinical services contracted by NGOs 	None	<ul style="list-style-type: none"> • Illegal drug distribution • Low working capital • High rental cost of drug shop • Failure of NGOs to involve the private vet in mass vaccination and CAHWs programs
Nadunget Livestock and Produce Coops	Owner: Cooperative Attendant: Certificate in Animal Health	Nadunget sub-county, Moroto (2015/16)	Active	Supported by Millennium Promise program	Customers: Livestock owners Services: Dispense curative drugs of wide range	None	None mentioned

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Name of drug shop	Qualification of owner and/or attendant, and legality	Location (year established)	Present status	How the business started	Services provided and customers	Other sources of income	Challenges and constraints
PAVENET (Pastoral Veterinary Systems Network)	Owner: Veterinarian and Animal Husbandry Officer (Diploma) Attendant: CAHW	Kotido (2003)	Active	<ul style="list-style-type: none"> Opened with drugs granted by Oxfam as start-up stock; valued at UGX10 million Business skills, record keeping, training, and advertising the business 	<p>Customers: Largely livestock owners and a few CAHWs, with the same price</p> <p>Services:</p> <ul style="list-style-type: none"> Dispense wide range of drugs Technical advice on drug usage Technical services: training of CAHWs, training of community members through PFS, mass vaccination and tsetse control campaign contracted by government and NGOs 	One of the partners of the business is also a full-time employee of NGO	<ul style="list-style-type: none"> Illegal drug distribution Inaccessibility Lack of means of transport to cover large areas
JICA HWA	<p>Owner: Initially set up by CAHWs association but currently fully controlled and owned privately by a few individuals</p> <p>Manager: Paul Lomadiko (CAHW)</p> <p>Attendant: Lokure Alexes (CAHW)</p> <p>Technical support: provided by vets employed by the association between</p>	Kotido (2003)	Active	<ul style="list-style-type: none"> Received drug stock valued at UGX20 million from Oxfam in 2007. Oxfam also supported construction and stock supply to the outlet shops Business skills and record keeping training in 2007 Linkage with suppliers in Kampala Restocked with 	<p>Customers: Largely livestock owners and a few CAHWs with subsidized prices for the latter</p> <p>Services:</p> <ul style="list-style-type: none"> Dispense curative drugs Offer advice on drug usage Conduct training of CAHWs contracted by NGO (notably Oxfam) 		<ul style="list-style-type: none"> Illegal drug distribution Free drug distribution by NGOs and politician Lack of cold chain facility Lack of means of transport The use of proceeds collected from drug sales for unrelated activities, resulting

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Name of drug shop	Qualification of owner and/or attendant, and legality	Location (year established)	Present status	How the business started	Services provided and customers	Other sources of income	Challenges and constraints
	2011–2014			UGX20 million loan secured from Stanbic Bank through a repayment guarantee provided by Mercy Corps			in low operating capital • Reluctance of wholesale companies in Kampala to deliver stock valued below UGX5 million
	Outlets: • JICA HWA Rengen • JICA HWA Panyangara sub-counties	Rengen and Panyangara sub-counties (2010)	Failed		Both outlets were non-functional during this review, and were closed down because of poor performance.		
DOCAHWA	Owner: Association/Private Manager: CAHW Attendant: CAHW	Kaabong (2007)	Active (but weak)	<ul style="list-style-type: none"> • Opened with drug stock donated by Oxfam valued at UGX20 million and construction of the outlet shops • Business skills, record keeping, training, and advertising the business by Mercy Corps • Linkage with suppliers in Kampala • Received a drug loan valued at UGX5 million (\$1,500), from Notbrook, with Mercy Corps providing repayment 	<ul style="list-style-type: none"> • Customers: Largely livestock owners and a few CAHWs, with subsidized prices for the latter • Services: Dispense curative drugs of limited range 		<ul style="list-style-type: none"> • The use of proceeds collected from drug sales for unrelated activities, resulting in low operating capital • Free drug distribution from NGO and politician • Limited range of drugs, and business is weakening • Property right has shifted from association to

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Name of drug shop	Qualification of owner and/or attendant, and legality	Location (year established)	Present status	How the business started	Services provided and customers	Other sources of income	Challenges and constraints
	Outlets: • DOCAHWA Kathile • DOCAHWA Sidok • DOCAHWA Kalapata	Kathile, Sidok, and Kalapata sub-counties (2010)	Failed	guarantee Started with initial drug stock granted by Oxfam but failed to replenish their stock			private
Amaikort	Owner: Private, CAHW Attendant: Owner and often wife	Kaabong	Active	Started using own funds	Customers: Livestock owners Services: Dispense limited range of curative drugs		According to Mercy Corps staff in Kaabong, all outlets were non-functional during this review and closed down because of poor performance and misuse of the funds.
Happy Cow		Kaabong	Failed	Initiated by CVM	According to Mercy Corps staff in Kaabong, the drug shop was non-functional during this review because of poor performance and failure to restock.		
Genesis	Owner: Private, AHO Manager/attendant: Owner	Abim	Active		Customers: Livestock owners and a very few CAHWs Services: Dispense limited range of curative drugs		
Sagovet	Owner: Association comprising veterinary and non-veterinary professionals Attendant: CAHWs, often supervised by vet	Abim	Active but at lower scale	<ul style="list-style-type: none"> Initially established as a private entity but later transformed into association by including non-professional members to enable access to funding. Received UGX12 	Customers: Largely livestock owners and a few CAHWs Services: <ul style="list-style-type: none"> Dispense curative drugs but limited range Dispense Newcastle vaccine 		Failure to restock regularly because of unavailability of decision makers. The financial management looks appropriate in that the shop attendant

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ANNEX 6. SUMMARY INFORMATION ON PRIVATE VETERINARY DRUG RETAILERS

Name of drug shop	Qualification of owner and/or attendant, and legality	Location (year established)	Present status	How the business started	Services provided and customers	Other sources of income	Challenges and constraints
				million loan from YLP in 2015 • Linkage with suppliers in Kampala			deposits revenue collected from drug sales into the Association bank account, but withdrawal of cash involves members of the Association identified as signatories to approve checks (cash withdrawal to buy drug stocks). However, the signatories were not available most of the time within the district to approve checks, thus delaying restocking of the store.
CLIDE	Research and consultancy group	Napak	Active	Started by a group of individuals, including former CVM staff	Focus on promoting the use of traditional medicine	Consultancy services	Lack of funding to commercialize some of the traditional medicines
ALOEVET	Owner: Dr. David Klaiswa (vet)	Napak	Active	Initiated using personal funds but later received	Customers: Largely livestock owners and a few CAHWs		

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Name of drug shop	Qualification of owner and/or attendant, and legality	Location (year established)	Present status	How the business started	Services provided and customers	Other sources of income	Challenges and constraints
	Attendant: Topos Jimmy (Certificate in animal health as CAHW)			support from ACDI/VOCA.	Services: Dispense curative drugs and advice on drug usage		
Naveye	Owner: Josephine Amodoi (Diploma in animal husbandry)	Napak	Active		Customers: Largely livestock owners and a few CAHWs Services: Dispense curative drugs	Owner is also a full-time employee of government as livestock expert	High operational costs, competition from illegal (unqualified and unlicensed) drug sellers, and unwillingness of Kampala-based companies to deliver stock
PCAHWA	CAHW Association, managed by AHO	Amudat			Customers: Largely livestock owners and a few CAHWs, with subsidized prices for the latter		
Happy Cow		Amudat	Failed	Supported by CVM	According to the District AHO (Motos Akoromoi Stephen), the shop went bankrupt after NGO support stopped.		

ANNEX 7. NON-GOVERNMENTAL ANIMAL HEALTH SERVICE PROVIDERS IN KARAMOJA

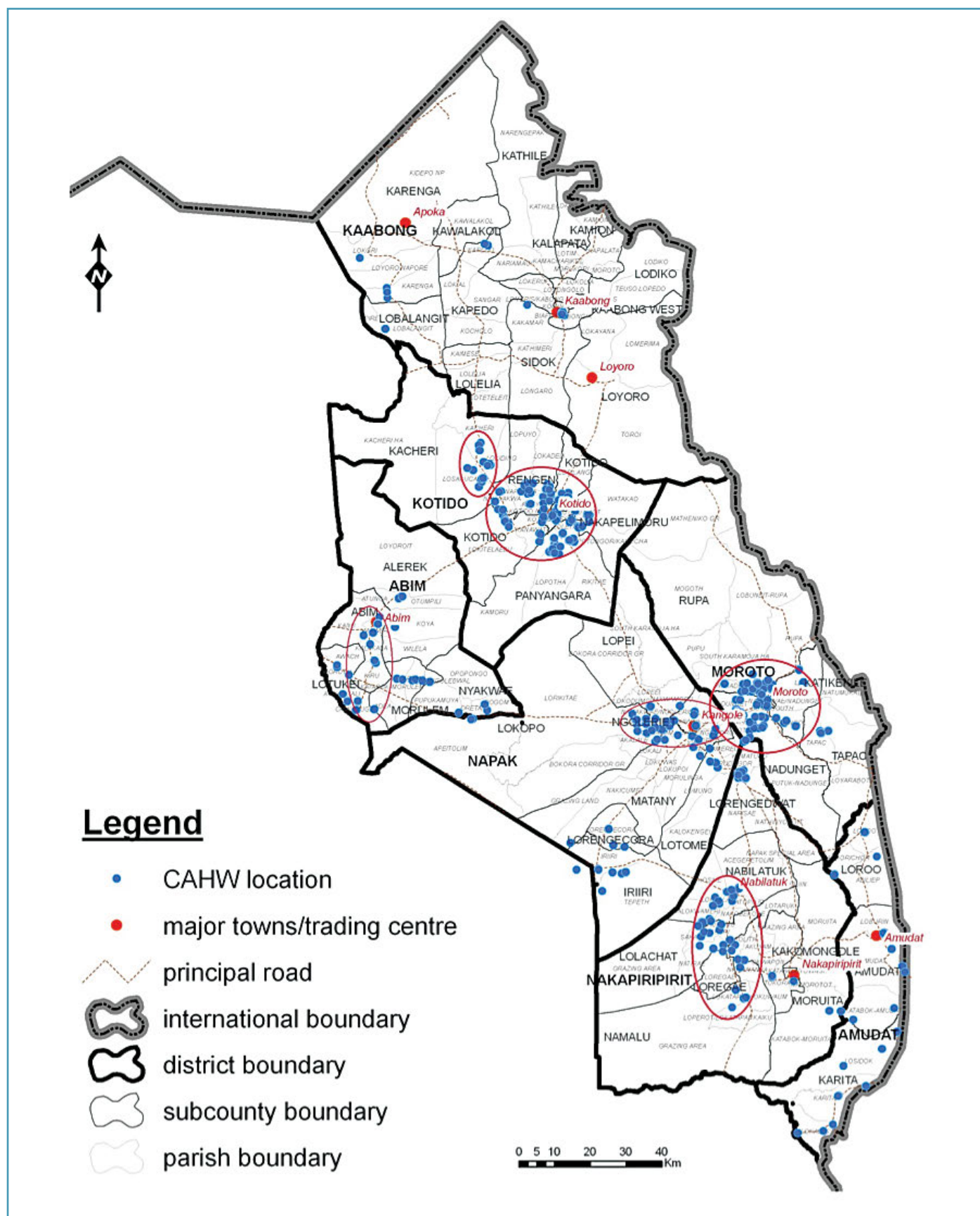
AHSPs	Districts	Training	Drug and vaccine supply	Vaccination campaigns	Veterinary research	Disease surveillance and diagnostic
ACDI/VOCA	Amudat, Moroto, Nakapiripirit, Napak	CAHWs	Support establishment of drug shop outlets			
Concern Worldwide	Moroto, Nakapiripirit, Napak	CAHWs	Initial stock supply to CAHWs			
C&D		CAHWs				Supported Karamoja veterinary laboratory
FAO	Abim, Kaabong, Kotido, Amudat, Moroto, Napak, Nakapiripirit	<ul style="list-style-type: none"> • CAHWs refresher course • Livestock owners training through field schools • Disease surveillance and reporting training for government vet. staff and CAHWs 	<ul style="list-style-type: none"> • Drug supply to CAHWs • Procurement of vaccines • Often free drug supply to livestock owners 	Supported vaccination campaigns through: <ul style="list-style-type: none"> • Procuring vaccine • Funding transport and per diem expenses • Supplying cold chain facility to all DVs 		Established EMPRES-i disease reporting system
International Rescue Committee	Moroto, Amudat, Napak, Nakapiripirit		Provided start-up stock to private drug shop	Funded vaccination campaign; provided CAHWs' per diem		
Mercy Corps						
GHG project	Abim, Kaabong, Kotido, Amudat, Moroto, Napak,	Drug suppliers' training on business skills and management	<ul style="list-style-type: none"> • Linkage with drug companies in Kampala • Facilitated access 	Support vaccination campaigns in collaboration with	Supported a study on constraints to livestock health in	

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AHSPs	Districts	Training	Drug and vaccine supply	Vaccination campaigns	Veterinary research	Disease surveillance and diagnostic
	Nakapiripirit		to loans from financial institutions	DVOs and FAO	Karamoja, focusing on trypanosomiasis	
GIRL project	Amudat, Kotido, Moroto, Nakapiripirit	Training project beneficiaries on goat health and production				
BRACED project	Kaabong, Kotido, Moroto, Napak	Drug suppliers' training on business skills and management	<ul style="list-style-type: none"> • Linkage with drug companies in Kampala • Promotion of business 			
Millennium Promise Alliance, Inc.	Amudat, Moroto, Nakapiripirit, Napak		Established cooperative drug shop in Moroto			
Oxfam	Kotido and Kaabong	CAHWs	Support of establishment of drug outlets through CAHWA			
VSF-Belgium	Kaabong and Moroto	CAHWs	<ul style="list-style-type: none"> • Initial drug stock supply to CAHWs • Support establishment of drug outlets through CAHWA 			
Welthungerhilfe	Amudat, Moroto, Nakapiripirit, Napak	CAHWs				

ANNEX 8. DISTRIBUTION OF CAHWS IN KARAMOJA



(Source: Modified from FAO-Uganda.)

ANNEX 9. LIST OF KEY INFORMANTS

No.	Name	Position	Organization	Contact E-mail address	Telephone	Event
Kampala						
1	Prof. Charles Waiswa	Executive Director	Office for the Control of Trypanosomiasis	admin@coctu.go.ug	0772501274/0414250726	One-to-one interview
2	Massimo Castiello	Deputy Rep.	FAO-Uganda	massimo.castiello@fao.org	0786031318/0414340324	One-to-one interview
3	Rachel Beckett	Country Rep.	FARM Africa	rachelb@farmafrica.org	0775192359	One-to-one interview
4	Ongodia Patrick	Executive Director	Council for African Policy	ongodopatrick@gmail.com	0772633107/0414691799	One-to-one interview
Moroto						
5	Dr. Julius Lwegaba	Project Officer	Welthungerhilfe	julius.lwegaba@welthungerhilfe.de	0773098512	One-to-one interview
6	Thomas Ameny	Program Officer	FAO	Thomas.Ameny@fao.org	0774407257/0414340324	Group discussion
7	Dr. Patience Akure	Veterinarian	FAO	Patience.Akure@fao.org	0788244913	Group discussion
8	Dr. Barba Dennis	Veterinary Officer	Local government	wbarbadennis@yahoo.com	0783162045	Group discussion
9	Dr. Elanyu Sam	Veterinary Officer	Local government	elanyusam@gmail.com	0772996892	Group discussion
10	Ewatu Noah Ojwok	Animal Husbandry Officer	Local government	noahewatu82@gmail.com	0773965648	Group discussion
11	Dr. Egaru Emmanuel	Program Officer	Concern Worldwide			One-to-one interview
12	Wilham Obanyo Otoké	Team Leader	Mercy Corps/ BRACED/MSFS			One-to-one interview
13	Elizabeth Valone	Program Director	Mercy Corps/GIRL			One-to-one interview
14	Dr. Poncianah Akumu	Veterinarian	Mercy Corps/GHG			One-to-one interview
15	Dr. Valery Shean Lomilo	Team Advisor	CLIDE Consultancy	africavet@yahoo.com	0782658151	One-to-one interview
16	Dr. Emmanuel Emaruk	Program Manager	VSF-Belgium	e.emaruk@vsf-belgium.org	0755970592/0782970592	One-to-one interview
17	Nate Lucy Akol	Manager	Ekisil Drug Shop		0758711746	One-to-one interview
18	Okidi Mark	Manager	NSCCS		0785881029	One-to-one interview
19	Abonyo Sarah	Branch Manager	NSCCS			One-to-one interview
20	Luke Ngorok	DADI for Moroto and Napak	NDA		0772917241	One-to-one interview
21	Dr. Tebeje Kibret	Manager	Mercy Corps/GHG			One-to-one interview
22	Denis Kotel	Field Coordinator-Karamoja	International Rescue Committee	Denis.Kotel@rescue.org	0776026000	One-to-one interview

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No.	Name	Position	Organization	Contact E-mail address	Telephone	Event
23	Kul Chandra	Coordinator	C&D		0781286934	One-to-one interview
24	Francis Omaongin	Laboratory Technician	Karamoja Vet Laboratory	omonginfrancis@gmail.com	0773719009	One-to-one interview
25	Dr. Naome Othini	Owner/Manager	MIONA Veterinary Centre	alow.naome@gmail.com	0773044119	One-to-one interview

Napak

26	Lokoru Jimmy Tebaryang	Sec. Production and Marketing	Local government			Group discussion
27	Hon. Lomowyang Joseph	District Chairman	Local government		0772909020	Group discussion
28	Anyakun Charles Lotella	District Planner	Local government		0782210544	One-to-one interview
29	Dr. Inangolet Olali	DVO	Local government	dinangolet@yahoo.com		One-to-one interview
30	Topos Jimmy	Drug Shop Attendant	ALOEVET Drug Shop			One-to-one interview
31	Dr. David Klaiswa	Owner/Manager	ALOEVET Drug Shop	dwaiswa@gmail.com	0771602681/0751602681	Telephone interview
32	Josephine Amodoi	Owner	Nayeye Vet Drug Shop	amodoijosephine@gmail.com	0774781885	Telephone interview

Kotido

33	Emmanuel Kalema	Livestock Officer	Mercy Corps/GIRL			One-to-one interview
34	Dr. Mulondo Henry	DVO	Local government	henrymulondo@gmail.com	0782165915	Group discussion
35	Ogwang Constantine	AHO	Local government	Constantineogwang@yahoo.com	0782405109/0759598001	Group discussion
36	Abura Loul	DPO	Local government		077284449	One-to-one interview
37	Paul Lomadiko	Drug Shop Manager	JICA HWA		0781922177	Group discussion
38	Lokure Alexes	Drug Shop Attendant	JICA HWA			Group discussion
39	Lena Godfrey Lokwang	Program Manager	Caritas Kotido Diocese	godfreylena@yahoo.com	072835724/0753835724	One-to-one interview
40	Kain		Mercy Corps			One-to-one interview
41	Dr. Lochap Paul	Director	Caritas Kotido Diocese	plochap@yahoo.com / lochap@gmail.com	0772605387/0752112777	One-to-one interview
42	Mark	Drug Dispenser	PAVENET Drug Shop			One-to-one interview
43	Opio Moses	Team Leader	Mercy Corps/LHM			One-to-one interview
44	Ignatius Ludikio	DADI for Kotido	NDA		0772394518	One-to-one interview
45	Moding Raphael	Manager	PAVENET Drug Shop			One-to-one interview

ANNEX 9. LIST OF KEY INFORMANTS

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No.	Name	Position	Organization	Contact E-mail address	Telephone	Event
Kaabong						
46	Dr. Logwee John Branda	DVO	Local government	dr.logwee@gmail.com	07822291665	One-to-one interview
47	Lopole Michael	Shop Attendant	DOCAHWA			Group discussion
48	Lokoro Raphael Achilla	Manager	DOCAHWA			Group discussion
49	Dr. Maureen Kamusiime	Project Manager	Mercy Corps/LHM	mkamusiime@mercycorps.org	0774174899	Group discussion
50	Aduro Juliet	Economic Mercy Corps/LHM Development Officer		jaduto@ug.mercycorps.org	0787074758/ 0754802129	Group discussion
51	Julius Akom	Owner/Manager	Amaikort Drug Shop			Telephone interview
Abim						
52	Ogwang Jino	DPO	Local government		0772348957	One-to-one interview
53	Dr. Okengo Osean	DVO	Local government		0772996147	Telephone interview
54	Jacob Olinga	Shop Attendant	Sagovet Drug Shop			One-to-one interview
55	Dr. Abram Sam Grace	Veterinarian	Sagovet Drug Shop		0778158868	Telephone interview
56	Angeo Lucy	Owner	Genesis Drug Shop		0773016679	Telephone interview
Nakapiripirit						
57	Dr. Kattiya Damimle Lokews	DPO	Local government	kattiyaavetug@yahoo.com	0772335483/0788964048	One-to-one interview
58	Dr. Arionga Simon	VO	Local government	sarionga@yahoo.com	0772594031/0756941019	One-to-one interview
Amudat						
59	Motos Akoromoi Stephen		Local government		0788966013	One-to-one interview
60	Dr. Mikle Kaziro	DVO	Local government		0782529503	One-to-one interview
61	Losia Philip	AHO	PCAHWA manager and drug shop attendant		0780219288	One-to-one interview

