Karamoja Resilience Support Unit (KRSU), Uganda

Livestock in Karamoja

A review of recent literature

June 2016

This publication was produced at the request of the United States Agency for International Development.
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USAID Contract Number: 617-15-000014
Karamoja Resilience Support Unit

Implemented by:
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Acknowledgments:
The input of various informants in Karamoja and Kampala during the preparation of this report is gratefully acknowledged. Cover photo by Khristopher Carlson.

Suggested citation:
Aklilu, Y. (2016). Livestock in Karamoja: A Review of Recent Literature. Karamoja Resilience Support Unit, USAID/Uganda, Kampala.

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Acronyms

ASAL	Arid and Semi-Arid Land
AU/IBAR	African Union/Interafrican Bureau for Animal Resources
CAHW	Community-based Animal Health Worker
CBPP	Contagious bovine pleuropneumonia
DVO	District Veterinary Officer
ECF	East Coast fever
FAO	Food and Agriculture Organization
FEWSNET	Famine Early Warning System Network
FMD	Foot and mouth disease
GDP	Gross Domestic Product
GoU	Government of Uganda
HoA	Horn of Africa
ICPALD	IGAD Centre for Pastoral Areas and Livestock Development
IGAD	Intergovernmental Authority on Development
KIDP	Karamoja Integrated Development Programme
KRSU	Karamoja Resilience Support Unit
LUA	Livestock User Association
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries
NDVI	Normalized Difference Vegetation Index
NGO	Non-governmental Organization
RLP	Resilience Learning Project
RPLRP	Regional Pastoral Livelihoods Resilience Project
TLU	Tropical Livestock Unit
UBOS	Uganda Bureau of Statistics
UGX	Ugandan Shilling
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
VSF-B	Vétérinaires Sans Frontières Belgium
WB	World Bank
WFP	World Food Programme
WHH	Welthungerhilfe

Executive Summary

Karamoja is situated in the northeast part of Uganda. It has seven districts and a population of some 1.3 million people. The region is dominated by savannah grasslands, isolated woodlands, and transient streams. The topography ranges from low-lying plateaus to rolling, flat plains, with altitude ranges of 1,000 m to 1,400 m. The region is considered a semi-arid region with a unimodal rainfall pattern, ranging from 500 mm to 700 mm of rain per year, but up to 1,000 mm in some areas. Livestock production is the dominant livelihood system, followed by more risky crop farming. The region encompasses five livelihood zones and three livestock production systems, primarily agropastoral groups, followed by mixed crop/livestock farmers, and a small proportion of pastoral groups. Rainfall distribution is highly variable and more often than not inadequate for crop production but not so inadequate for pasture.

Outside of natural causes, livestock production in Karamoja has been seriously affected by endogenous and exogenous factors. Persistent inter-communal conflicts were characterized by violent cattle raids that not only impoverished many households but also contributed to substantial outmigration and a shift towards more risky livelihood strategies. Seasonal livestock movements were dictated by safety considerations. A disarmament campaign of the Government of Uganda (GoU) from 2006 to 2011 included a "protected *kraal* system" that congregated large numbers of livestock in confined spaces, limited livestock grazing to a few hours a day in denuded areas, and transferred the management of the herd to army units. Communities were once again impoverished by substantial livestock losses due to diseases, shortage of water and feed, and reported theft by the "protectors." Despite this history and although peace is critical to the region's development, the current situation is that many households own no livestock due to raids followed by protected *kraal*s, events such as droughts and disease outbreaks, and a long-term trend of human population growth. Although accurate livestock population figures are not available, a crude analysis of human and livestock population trends from 1959 to 2002 indicates a per capita decline in livestock holdings from around 2.7 TLUs (Tropical Livestock Units)/person to 1.3 TLUs/person over this 43-year period. This analysis uses data from the Uganda Bureau of Statistics from 2002, because livestock data from a later 2008 survey were viewed as implausible.

Karamoja has often been described as the poorest region in Uganda. It has received regular food aid for almost three decades, and the region has the lowest social development indicators in Uganda and the lowest per capita cash expenditure. However, a deeper analysis offers a different picture. For example, households with livestock are not necessarily poor if the value of their financial assets/livestock is compared to the cash assets or income of rural households in other regions of Uganda. For some analysts, labelling Karamoja as universally poor contributed to a policy environment in which sedentary crop production was prioritized, leading to the area of land under cultivation increasing tenfold between 2001 and 2014. At same time, seasonal food security assessments consistently showed that households with livestock survived shocks better than farming communities did. Overall, droughts have impacted crop producers rather than livestock herders. At times, various development aid donors, UN agencies, and non-governmental organizations (NGOs) have supported the promotion of farming, without fully understanding its limitations in an area with highly variable rainfall such as Karamoja.

Key issues affecting livestock development

Veterinary services: After natural crises and insecurity, the main constraint to livestock production is the presence of various livestock diseases and related losses due to livestock deaths, reduced production, or market restrictions. Government veterinary services are almost nonexistent—as they have been for decades—and development agencies are overwhelmed by continuous requests for support. Private sector services have emerged slowly, and facilities such as "drug shops" provide only a limited service. Around 42 percent of these shops seem to have received support from NGOs, channelled to associations of para-veterinary workers such as Community-based Animal

Health Workers (CAHWs). In general, associations have a poor record of success in the provision of livestock services in Africa, indicating that the "association model" of service provision in Karamoja and options for ensuring medicine supply to CAHWs need urgent review.

Water shortages: These are the second important constraint to livestock development. Water development interventions have been deliberately sited to enhance settlements rather than for livestock use. Many boreholes have broken down, leading to competition between people, livestock, and irrigation in places where water sources are operational. Valley dams are disproportionately located across districts, and only two dams have water throughout the year. In total, only about 11 percent of water facilities in the region are designed for livestock. Though the availability of pasture is relatively good, shortages during the dry season arise when livestock congregate around water sources, implying that feed scarcity is intrinsically linked to water shortage rather than lack of pasture. A survey established that some 75 percent of the population perceives forage to be sufficiently available in quality and quantity over a 12-month period, with differentiated availability by livelihood zones.

Understanding livestock marketing: The marketing behavior of the Karamajong is influenced by the need to accumulate financial capital, i.e., livestock, in a similar way to the accumulation of land or cash in other societies. In general, livestock sales occur in response to cash needs, rather than in response to price. In a context of limited livelihood options, variable rainfall, and household food security that depends on consuming livestock-derived food (especially milk) or selling livestock to buy grain, this marketing behavior has a strong economic logic. However, in common with pastoralist marketing practices in other areas of East Africa, these behaviors are widely misunderstood by livestock and marketing experts, and policy makers, leading to herders in Karamoja often being described as "non-commercial" or irrational. Across East Africa, there is a clear pattern of gradual commercialization of pastoral livestock production systems in specific areas. In Karamoja, this process seems to have started to some extent, with some herders "trading up" and selling fattened cattle immediately after the rains to purchase heifers for breeding. Also, despite the commonly held view that the Karamajong do not sell many animals, the region has become the major supplier of livestock to eastern Uganda, from Teso to Jinja, and it has also been one of the two major livestock suppliers to Juba in South Sudan, along with Teso region.

Policy issues: For many years, development policy and programs in Karamoja have been dominated by the notion that sedentary crop farming is more viable and productive than mobile livestock production. At times, cattle have been described as "the curse of Karamoja."[1] It has been felt that the "'dangers' of pastoralism in Karamoja more than outweigh the benefits" (Bushby and Stites, 2016). At the policy level, these narratives may have contributed to the gazetting of prime grazing land for national parks and mining concessions, and limited efforts to secure land rights for Karamajong herders. However, a policy shift may be occurring: a new regional Intergovernmental Authority on Development (IGAD) program, Regional Pastoral Livelihoods Resilience Project (RPLRP), currently covering Uganda and Kenya, has a clear pro-pastoralist framing. This is in line with official recognition of the economic and social benefits of pastoralism by IGAD and the African Union. The RPLRP is funded by the World Bank (WB) and includes Karamoja.

Recommendations

In light of the major constraints affecting livestock production and within the limited mandates of the KRSU, the following recommendations are made to guide the next course of priority actions for influencing policy in the new WB project and other potential initiatives in the future:

- Review veterinary service delivery in Karamoja and develop a single strategy to which Government and NGO activities should be aligned. These actions should be complemented

[1] Interview with a NGO staff member in Moroto, name withheld.

by reviews of the strategies for controlling specific livestock diseases. Strategies need to be technically feasible, affordable, and acceptable to local stakeholders, with clearly defined roles for the public and private sector.

- Explore the potential for market-oriented livestock production (value addition) in Karamoja—feed processing, fodder production, feedlots, and trade linkages—followed by pilot projects.
- Conduct a joint assessment of policy constraints on the policies of the African Union, IGAD, and COMESA (The Common Market for Eastern and Southern Africa) to inform recommendations for pro-pastoral policy formulation in Uganda.

1. Introduction

This review is drawn largely from the literature produced during the last five years on Karamoja generally, and more specifically on the livestock sector in Karamoja. Additional information was obtained through interviews in Kampala and Moroto with Government and NGO staff in April and May 2016. The review synthesizes the main issues impacting livestock production in the region and identifies critical factors affecting livestock production.

The review is structured as follows:

- A brief introduction to the Karamoja region;
- A short description of the five main livelihood systems in the region, mainly drawn from reports of the Food and Agriculture Organization (FAO) and, to some extent, the World Food Programme (WFP);
- A review of food security and perceptions of poverty in Karamoja from the perspectives of the literature and the local population;
- A detailed review of livestock production and marketing, including the major livestock production constraints affecting pastoral and agropastoral communities in Karamoja, the status of animal health services, water sources and feed availability, and an analysis of livestock population figures. This section also includes a review of perceptions of the Karamajong behavior towards livestock marketing;
- An analysis of policy issues affecting livestock-dependent communities, including recent policy shifts;
- A final section of conclusions and recommendations.

2. Karamoja—a brief overview

Karamoja is located in northeastern Uganda bordering Turkana (in Kenya) in the east and south, and South Sudan in the north. The region is subdivided into seven districts: Abim, Amudat, Kaabong, Kotido, Moroto, Nakapiripirit and Napak. Karamoja covers an area of some 27,511 square kilometers with a human population of 1,372,386 (FAO, 2015a). According to Egeru et al. (2015a), "Karamoja is dominated by savannah grasslands punctuated by isolated woodlands on the slopes and tops of mountains and also by ephemeral streams that flow east to west. The topography consists of a low lying plateau, rolling plains and broad rolling to flat plains rising to an altitude of 1000 – 1400 m in most locations."

Karamoja is a semi-arid region in which livestock production is the dominant mode of livelihood, followed by crop production. The rainfall pattern is unimodal, with a single rainy season from March to October, followed by an extended dry season. As with other pastoral areas in East Africa, rainfall is unpredictable, both in spatial and temporal terms. Regardless, Karamoja receives an average of 500–700 mm of rain in the central lowland areas, and 700–1,000 mm in the wetter western areas.[2] According to FAO (2015b), "Rainfall distribution is more often than not inadequate for optimal crop production, and there is typically a lull in the middle of the rainy season; however, rainfall levels are almost never inadequate for pasture and browse." This rainfall makes Karamoja different from many pastoral areas of Kenya, Somalia, Ethiopia, and Sudan, which are characterized by far greater risk of inadequate rainfall and related shortages of pasture and browse for livestock.

However, in common with other pastoral areas of East Africa, Karamoja is characterized by low human development indicators relative to national figures e.g., in terms of nutrition, education,

[2] Mugerwa et al. (2014) citing Ndule (2010), on the other hand, state that the annual rainfall variation in the region ranges between 350 mm and 1,000 mm.

water, and health services (Mercy Corps, forthcoming; Action Against Hunger, 2013; FAO, 2015b). As such, the region has been regarded "as an exceptional situation area, disconnected from the rest of Uganda in cultural and economic terms, and desperately needing to catch up" (Kratli, 2010). This underdevelopment and persistent insecurity in the region led the Government of Uganda to embark on a disarmament campaign in 2006. Ultimately, this campaign was reported to have brought relative peace but also led to the impoverishment of cattle-raising communities under the protected *kraal* system instituted during the disarmament process, which lasted until 2011.

3. Livelihoods in Karamoja

A livelihood zoning exercise conducted in 2009 identified a total of 38 livelihood zones in Uganda, including six in Karamoja (FEWSNET, 2010). A further Household Economy Analysis (HEA) conducted by FAO (2015a) in Karamoja reported a substantial increase in crop production beginning in 2012[3] and raised a concern about the validity of the six livelihood zones identified by the Famine Early Warning System Network (FEWSNET). In consultation with FEWSNET and other partner organizations, FAO then realigned the livelihood zones in the region to five,[4] as follows:

- *Central sorghum and livestock zone*: This zone is home to some 60 percent of the population in Karamoja, with largely agropastoral systems where livestock are more important than crops. Households need to purchase much of their staple grains, but in years of good rainfall some 70 percent of the household income could be derived from crops. Even in such years, households are forced to sell livestock to meet their food requirements. Households also engage in other economic activities, such as selling firewood, charcoal, grass, poles, etc.
- *Mountain slopes maize and cattle zone*: Livestock form the basis of the local economy, with a recent shift to some crop production, with limited areas of sorghum, maize, and beans. There is also mining for gold and marble in the zone. Beekeeping and *khat* gathering on the mountain slopes provide additional income.
- *Northeastern highlands apiculture zone*: Livelihoods are based dominantly on agriculture (maize, sorghum, and finger millet) and also on honey. There is limited livestock production. Crop production is severely constrained by manual labor requirements despite high potential. This is the poorest zone in the region.
- *Southeastern cattle and maize livelihood zone*: This zone is fundamentally a pastoral one that in good years generates more household income than all other zones in Karamoja. Households also plant crops, which pays off in good years but provides little income in most years. Reliance on milk and livestock sales is higher than in the other zones. Camels are also raised in small numbers. There is vibrant cross-border trade with Kenya. Livelihoods also include honey production and sales of *khat*.
- *Western mixed crop farming zone*: The zone is endowed with fertile soils and abundant rainfall. Households generally meet their food requirements without external assistance, mainly from crops complemented by livestock production. A variety of crops is grown, with better-off households using ox plows and the poor relying on hand hoes. This is the favorite emigration zone for desperate people from other parts of Karamoja, in part due to better opportunities for self-employment.

4. Food security and perceptions of poverty

For many years, Karamoja was associated with persistent local conflict involving cattle raiding, robbery, theft, and wanton killings. As a result, livestock wealth inequalities between communities and households were partly driven by violent raids, in addition to livestock diseases and droughts

[3] Those who took up farming include households who lost their livestock to the disarmament campaign and raiding, and widowed households who lost their husbands due to raids (see Stites and Akabwai, 2012 for more details).
[4] The livelihood zone rearrangement took place by reassigning some parts of the former six zones into five uniform livelihood zones.

(Burns et al., 2013). Similarly, seasonal livestock movements, which normally should have been influenced by climatic and edaphic conditions, were rather dictated by security concerns. Movements were to areas considered safe for defense by community groups. Rangeland degradation in some locations was attributed to the congregation of livestock close to water points and in safer areas. Meanwhile, the Government's disarmament campaign and the protected *kraal* system from 2006 to 2011 were reported to cause immense losses of livestock due to restricted access to pasture and water. The confinement of thousands of cattle in limited areas led to disease outbreaks. There was also reduced access of owners to their own stock, and repeated branding by soldiers and theft (FAO/GIEWS, 2014). The Government's intervention has ultimately improved the level of security in the region and reduced resource-based conflicts between rival community groups. Yet, coupled with droughts, occasional floods, and livestock diseases, the culminating effects of traditional raiding practices and the interim disarmament interventions have been epitomized by household livestock losses, out-migration, and shifting livelihood patterns caused by desperation (Stites et al., 2014).

From a livelihoods perspective, it is not only important to look at the overall trend in livestock ownership in the region, but also at the ownership of animals by different wealth groups. Of note, raids may have contributed to livestock wealth redistribution, benefitting well-armed groups with increasing numbers of livestock. At the same time, losses from livestock diseases, drought, and high mortality rates during the protected *kraal* system probably reduced the total numbers of livestock in absolute terms. The net result is that most people had fewer livestock than before (Burns et al., 2013), while 40 percent of the population had no livestock at all (WFP/UNICEF/GoU, 2014). What epitomizes Karamoja as the poorest and the most food-insecure region in Uganda has been largely associated with low standard indicators on welfare and development scores. Table 1 underlines the welfare and development gap in Karamoja relative to other regions of Uganda.

Table 1. Human welfare and development indicators in Karamoja relative to Uganda

Welfare and development indicators	National average	Karamoja
Population living in absolute poverty	31%	82%
Maternal mortality rate per 100,000 births	438	750
Infant mortality rate per 1,000 live births	54	105
Under-five mortality rate per 1,000 live births	134	153
Global acute malnutrition	6%	11%
Access to sanitation facilities	62%	9%
Access to safe water	63%	30%
Literacy rate	63%	21%
Life expectancy	59.2 years	47.7 years

Source: IGAD, 2015.

The findings of other studies and assessments also support the figures in Table 1. A nutrition survey undertaken between 2009–12 by Action Against Hunger (2013) indicated that severe and global acute malnutrition rates in children aged 5–59 months were well above the accepted international levels, and more importantly, there were no significance changes during the three-year study period. A seasonal food security assessment conducted by WFP/FAO/GoU (2014) showed that only 52 percent of the sampled households had acceptable levels of food consumption in that year (a decline of 8 percent from 2012–13). The remaining 48 percent was evenly distributed between those having poor food consumption levels and those having borderline ones. The assessment concluded that the 2013–14 production outputs were inadequate for food and income needs of households in that production year. The situation was influenced by the rainfall pattern, which was between average and above average in March and April 2013, followed by a rapid reduction in May and a dry spell in June, when the crops were at flowering stage (WFP/FAO/GoU, 2014).

Another assessment undertaken by FAO (2015b) showed a rainfall performance beginning with a "generally poor start across most livelihood zones, reduced amounts in June and July, which resulted

in a dry spell in some areas followed by heavy rains in October towards the end of the cropping season." The assessment concluded that while the area cultivated increased among all wealth groups in all livelihood zones (except by two wealth groups in two livelihood zones), crop harvests were generally much lower in 2014 than in 2012 due to the impacts of poor rainfall. Despite the availability of pasture and water in most areas, the performance of livestock was affected by a high incidence of livestock diseases, including an outbreak of foot and mouth disease (FMD). This outbreak resulted in quarantine and closure of livestock markets, causing livestock losses and reduced milk production compared to the reference year of 2012.

The 2016 FAO seasonal food security assessment also indicates a late rainfall season beginning in March, peaking in April, and followed by a three-month dry spell from July to September (FAO, 2016b). The rains then resumed in October and continued through late November, but it was too late to mitigate the effects on crop production. FAO estimated that the long, dry spells have resulted in very low harvests across Karamoja, amounting to only 20 percent of the reference year (2012). Furthermore, while the late rains replenished water sources and improved pasture conditions, the prevalence of endemic livestock diseases kept household livestock holdings below the expected levels. FAO's projections showed 27 percent of the population (270,000 people)—belonging to the poorer wealth groups—was not able to meet its food requirements for about four months and an additional 43 percent of the population (430,000 people) did not have enough cash to protect their livelihoods.

The information above indicates that food insecurity in Karamoja is largely driven by rainfall distribution patterns within a given year rather than by the total amount of rainfall received (which is far higher than the rainfall in many other pastoral areas of East Africa). Of note, the unpredictable distribution pattern is more likely to affect crop production than livestock production, partly because pastoral livestock systems have evolved to cope with rainfall variations through mobility. Yet, despite the risks associated with unpredictable rainfall distribution patterns, the amount of cultivated land is increasing in Karamoja. For example, between 2000 and 2013 a tenfold increase in croplands was reported in Karamoja by a land cover and land use change analysis (Egeru et al., 2014). These changes were attributed to interventions by the Government of Uganda and development partners as a means to promote food security in Karamoja. FAO (2015b) also acknowledged the expansion of croplands (despite poor harvests) in its seasonal food security assessment but attributed the expansion to improved security that enabled farmers to access land. Other reports propose that the shift to crop cultivation was promoted by the central Government, following the loss of livestock under the protected *kraal* system (Bushby and Stites, 2016; Levine, 2010).

At this point, it becomes relevant to assess which livelihood system can withstand shocks better in the five livelihood zones, while also noting that rainfall varies by zone. The "Green Belt" in the western mixed crop farming zone, where 20 percent of the population lives, receives the highest amount of rainfall (800–1,000 mm). Here, crop farming is the dominant mode of livelihood due to fertile soils and good rainfall, and both FAO (2015b) and Mercy Corps (forthcoming) report that the Green Belt is the only zone in the region that can meet most of its food needs in a good year. However, in drier areas crop production is more risky, and, although practiced by the agropastoralists who make up most of the population, the reliance on crops is variable, "from households that have primarily shifted to agrarian livelihoods but still retain a limited livestock herd, to those who have primarily maintained pastoral livelihoods but complement these in times of idiosyncratic or covariate shocks with crop production" (Bushby and Stites, 2016). This raises the question of how the balance of crop versus livestock production affects a household's capacity to withstand shocks.

WFP/FAO/GoU's (2014) food security assessment concludes that households that rely more on livestock (in the southeastern cattle and maize livelihood zone and Amudat district specifically) were found to have coped better with the effects of the dry spell experienced in June that year than those

in the predominantly crop-producing areas. The FAO 2015 livelihood zone profiling (FAO, 2015a) also states that this zone generated more cash than all other zones in good years, because of livestock sales. These findings are supported by Burns et al. (2013): "In several of the villages assessed, when participants were asked how best could the growing inequality between the rich and poor be addressed, they suggested that peace and improvements in animal health would ultimately lead to a reduction in inequality as herd growth would eventually allow the rich to marry more daughters from poor households allowing for a redistribution of wealth through dowry payments." These findings imply that livestock production is not only an economic activity but is intrinsically embedded in the socio-cultural fabric of the Karamajong, since communities associate wealth primarily with livestock ownership. It also underlines that livestock diseases are among the major drivers of livestock wealth inequalities.

WFP/FAO/GoU (2014) assessments on coping strategies also show that livestock-dependent communities respond by offering more animals to markets, whereas crop-dependent communities use a variety of options, some of which are harmful to the ecology and the environment. Levine (2010) stresses this point further by stating that "both from the perspectives of increasing income and resilience both at household and community levels, pastoral and agro-pastoral livelihoods are more viable in Karamoja than crop farming even in bad years." He also stresses that with limited alternatives, complete crop failure events lead to environmental damage.

There is some recognition that much of Karamoja (outside of the Green Belt and perhaps the northeastern highlands apiculture zone) is most suitable for livestock production. For example, when describing the rainfall levels in the region, FAO (2015b) noted that "almost never inadequate for pasture and browse, [whereas] more often than not inadequate for crop production." Levine (2010) citing Nalule (not in the bibliography), describes the profile of the population that is increasingly shifting towards crop production as:

- Victims of raiding, especially widows with no herds;
- The very poor attracted by food aid;
- Children and young men forcibly removed from urban centers; and
- Young men who have no intention of settling permanently but are taking advantage of the seasonal demand for labor.

Stites and Akabwai (2012) reach similar conclusions on the driving factors for out-migration from Karamoja, the first three being:

- Loss of livestock (livelihoods) due to raids;
- Loss of livestock due to disease; and
- Persistent insecurity.

These studies suggest that the trends in crop farming and out-migration are due to the loss of livestock assets and increasing numbers of households with insufficient livestock. In a similar manner to South Sudan (FAO, 2016a), poverty has been inflicted on livestock-dependent households in Karamoja primarily by cattle raids and the associated insecurity, followed by livestock diseases, more than by natural shocks. The advent of peace in the region potentially removes the major cause of poverty, cattle raiding, and could provide a chance for many to rebuild their stock gradually. Improving animal health services is a matter of a commitment to putting in place a strategy that promotes and supports service provision by the private sector through training, incentives, legislation, and access to financial services. Otherwise, given the annual rainfall levels that are twice as high as other pastoral areas in the region (except South Sudan) and the relatively abundant pasture, Karamoja should not be the poorest region in Uganda in terms of household financial assets. In this regard, the initiative taken by the Government in distributing heifers to some households in the region could be indicative of some attitudinal changes at a higher level. The forthcoming World Bank project (Regional Pastoral Livelihoods Resilience Project) to support pastoral livelihoods in

Karamoja and some districts of Teso also signifies this policy shift. Even in the present situation, some argue that the Karamajong are no less poor than the population living in other parts of rural Uganda in broader terms:

> Detailed quantitative research clearly showed that even in a year with almost complete crop failure, the majority of households in the agro-pastoral and pastoral areas of Karamoja were able to cope without external assistance - only very poor households in the agro-pastoral and pastoral areas of Karamoja cannot cope without social support, in about the same proportion as in other areas of Uganda. The household incomes of the different economic groups were broadly comparable with households in the equivalent economic groups in other parts of rural Uganda, particularly once the accumulation of wealth (i.e. increase in herd sizes) is included as income. Although crop harvests are unreliable in most of Karamoja, households that are able to rely on semi-nomadic herding as a main livelihood strategy are able to cope with such crop failures. Settled households that depend on rain fed crop agriculture are not able to cope. Although erratic weather puts a stress on livelihoods in Karamoja, the main threats currently are not from the weather, but from restrictions on movement and insecurity. (Levine, 2010)

Perhaps what is missing in much of the literature is an understanding of poverty from the perspective of local communities. The findings of a recent assessment[5] on how communities perceive poverty showed that herding communities simply equate poverty with loss of livestock, farmers equate it with harvest failure, and those living in towns equate it with lack of jobs. These answers may not be surprising, but it helps to go back to the basics.

5. Livestock systems and population

5.1 Livestock production systems

There are three types of livestock production systems in Karamoja, which are already well described in FAO/GIEWS (2014):

- Agropastoral system: involves seasonal movement of herds combined with crop production and is practiced by the majority of the population;
- Pastoral system: the smallest system in terms of people involved, but pastoralists own bigger herds and flocks and cover longer distances during seasonal movements (up to 80 km); and,
- Settled livestock system in the western zone: involves utilization of local rough grazing, cereal by-products, and brewers' grains.

Some 97 percent of livestock are found in the pastoral and agropastoral systems (FAO/GIEWS, 2014).

5.2 Trends in livestock ownership

The most commonly cited livestock population figures for Karamoja are drawn from the surveys of the Uganda Bureau of Statistics in 2002 and 2008 and specifically, the agriculture modules or components of wider human population and housing censuses or similar surveys. However, figures on livestock ownership are derived from responses to a questionnaire, administered by an enumerator, and direct questions about the numbers of animals owned. In pastoral and agropastoral contexts, the validity of this method is probably low, because livestock owners are usually unwilling to provide accurate information on livestock holdings. Not only is livestock ownership a private matter, akin to a cash saving account in other societies, longstanding mistrust between herders and

[5] Author did not view the assessment report but was briefed on the findings during an interview with Mr. Dirk Ullerich of Welthungerhilfe (WHH), in Moroto.

Government will affect the responses. In addition, in situations where Government or external aid has been provided over many years, people will likely tailor their responses accordingly. In settled farming households, it may be possible for enumerators to crosscheck responses on livestock holdings by directly observing (and counting) the numbers of animals on a farm. However, in a pastoral setting this approach is problematic, because herds may be split and sent to different locations that may be difficult to access, including sites in neighboring countries. With these issues in mind, questionnaire-based data on livestock ownership produced by either Government or NGOs should be interpreted carefully.

As described in the Uganda Population and Housing Census (PHC) of 2002 (UBOS, 2002), a National Census of Agriculture and Livestock was conducted during 1990–91 (funded by United Nations Development Programme (UNDP), with technical support from FAO), but the results were seen as contentious and were not released. It seems that the agriculture module of the 2002 PHC was the first comprehensive set of livestock population figures officially released in recent years and included figures for Karamoja. However, estimates of Karamoja's livestock population date back to at least the 1980s, when Sandford (1988) suggested that "by 1980, for reasons of drought and insecurity, the Karamoja cattle population has probably fallen from around 700,000 head to 100,000." By 1988, cattle numbers were estimated at 230,000 by local veterinary staff, and it was proposed that a population of around 300,000 cattle would be reasonable given the available pasture and feed resources (Sandford, 1988). About seven years later in 1995, the Department of Animal Resources estimated around 595,000 cattle and 426,000 sheep and goats in Karamoja (cited by Catley, 1997), i.e., a substantial increase in cattle numbers relative to 1988, but consistent with the pre-1980 levels reported by Sandford (1988).

Table 2. Karamoja livestock population estimates

Year	Livestock species			Total
	Cattle	Sheep	Goats	
1959 (Novelli, cited by ACF, 2008)	600,000	210,000	160,000	970,000
1969 (Novelli, cited by ACF, 2008)	670,000	275,000	240,000	1,185,000
Pre-1980 (Sandford, 1988)	700,000	na	na	na
1980 (Sandford, 1988)	100,000	na	na	na
1988 (Sandford, 1988)	230,000	na	na	na
1996 (Catley, 1997)	595,000	426,000		1,021,000
2002 (UBOS, 2002)	1,439,433	993,935	1,068,265	3,501,633
2008 (MAAIF/UBOS, 2008)	2,253,960	1,685,502	2,025,293	5,964,755

Note: na = not available

In Karamoja, periods of livestock population "boom and bust" have taken place, with crises such livestock disease outbreaks (e.g., rinderpest in the 1890s) and drought (e.g., in 1980), followed by periods of recovery. The recovery of herds was not only through herd management and natural herd growth, but also through substantial raiding of neighboring areas. With this situation in mind, large fluctuations in livestock herds can be expected over time, and the figures in Table 2 between pre-1980 and 2002 seem plausible. However, far less plausible are the substantial increases in livestock population reported in the 2008 livestock census. As noted by FAO/GIEWS (2014), the 2008 figures represent increases in cattle numbers by 35 percent, and for small ruminants by about 76 percent, relative to 2002. Such figures are only feasible if massive livestock raiding took place between 2002 and 2006—the start of the disarmament campaign—and would need to be verified by corresponding decreases in livestock populations in neighboring districts in Uganda and Kenya. Also noted by FAO/GIEWS (2014), the 2008 livestock population figures imply a very high stocking rate in Karamoja of 1.92 TLU/hectare in 2008 relative to other dryland areas of East Africa, which typically have a stocking rate of around 0.5 TLU/hectare.

Perhaps more useful than absolute livestock populations over time are the general trends in livestock figures against human population growth. Assuming a human population of 170,000 in 1959 (Novelli, cited by ACF, 2008) and 966,245 in 2002 (UBOS, 2002), and although absolute livestock

numbers may have increased in during this 43-year period (Table 2), the TLU per person decreased from 2.7 in 1959 to 1.3 in 2002. In addition, the 2002 census reported high proportions of households owning no livestock in Kotido, Moroto, and Nakapiripirit districts (UBOS, 2002). Between 32 and 57 percent of households owned no cattle, 49 and 64 percent no goats, and 59 and 68 percent no sheep, depending on district. As noted earlier in the report, livestock numbers were thought to decline during the period of protected *kraals* from 2006 to 2011, indicating a further decline in livestock holdings per household. Surveys in 2015 reported that 40 percent of the population did not own livestock (WFP/UNICEF/GoU, 2014). Other recent reports also indicate falls in livestock holdings but show more specifically which households are affected. For example, between 2012 and 2014 there was a decrease in livestock holdings among very poor and poor households, but with gains made by middle and better-off households (FAO, 2015a). The highest number of cattle owned by the better-off groups was in the southeastern cattle and maize livelihood zone, where the household herd size was reported to increase from 19 to 22 head of cattle, from 25 to 26 sheep and goats, and from 1.5 to 6.5 camels. The numbers of cattle and small ruminants owned by the top better-off groups in Karamoja suggest that the average per capita TLU may be far lower than what the official 2008 figures portray. And the increase in camel ownership over two years cannot happen through a natural reproduction process.

While there are uncertainties over the exact numbers of livestock in Karamoja, the general trend of changing ownership by wealth group seems to fit the general trend in dryland areas of East Africa. As human populations grow, a shift in ownership takes place from poorer to wealthier households. This shift is reflected in growing numbers of food-insecure and poor households without livestock (Catley and Aklilu, 2013). There have been numerous calls to conduct a livestock census in Karamoja for the purposes of policy and planning, but substantial improvements in livestock services and marketing have taken place in pastoralist areas of Africa without accurate data on livestock populations. In part, this is because livestock are privately owned, and much of the activity of livestock management and marketing is a private activity. More important is to continue to monitor human poverty and food security trends, and livestock ownership by wealth group as the human population continues to increase.

6. Issues impacting the pastoral/agropastoral production system in Karamoja

6.1 Raiding and insecurity

Significant progress has been made in addressing cattle raiding and insecurity problems, ushering in a relatively peaceful era in Karamoja through the disarmament campaign. Most of the protected *kraals* have been dissolved, with perhaps a few remaining in the final phase. This improvement has been appreciated by communities, Government employees, and development partners.[6] Communities now travel to areas of former rival groups in search of pasture and water. The expansion of croplands by victims of raiding and conflicts is also partly attributed to the prevailing peace in the region. The Karamajong have reportedly developed a positive relationship with the army, to whom they report thefts and attacks by other groups. The army is reputed to be successful in recovering stolen animals.[7] Peace at any cost provides an opportunity to start afresh and without fear, and the Karamajong are realizing the benefits.

Outside of cattle raiding and conflicts, the three major constraints affecting livestock productivity are, in terms of priority: livestock diseases, water shortages, and seasonal pasture shortages (FAO, 2014, 2015b; Burns et al., 2013; RLP, 2016; NGO informants in Moroto, 2016[8]). These three problems have been reported for many years, at least since the late 1980s (e.g., Sandford, 1988).

6.2 Veterinary services and livestock diseases

6.2.1 Veterinary service delivery

Uganda has been pursuing a policy of liberalization and privatization of veterinary services since 1987. In 1989, the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) shifted the responsibility for the provision of clinical veterinary services and farm inputs to the private sector. This includes clinical services, provision of veterinary drugs and other supplies, food processing, tick control, livestock monitoring and artificial insemination, animal disease diagnosis, and some aspects of training of animal health service providers. The veterinary legal framework of Uganda encompasses a number of acts and regulatory institutions, of which the Animal Disease Act and the Veterinary Surgeons Act focus on controlling and eradicating livestock diseases and promoting, developing, and regulating the practice of veterinary medicine in the country, respectively (VSF-B, 2016). However, the Veterinary Surgeons Act does not recognize para-professionals, such as diploma and certificate holders and CAHWs, although there is a recent move to recognize them at the regional level.[9]

It is notable that CAHWs were first introduced into Karamoja in the early 1990s, supported by African Union/Interafrican Bureau for Animal Resources (AU/IBAR) and GoU under the Pan African Rinderpest Campaign, with the involvement of various international NGOs and FAO (Leyland, 1997). From 2000 to 2005, AU/IBAR supported policy dialogue on CAHWs, including positive reviews by the Faculty of Veterinary Medicine at Makerere University (Anon., 2001) and the Uganda Veterinary Association (UVA). For example, the UVA Executive Meeting in 2003, "recognises the work of CAHWs as a major force in supplementing veterinary service delivery in Uganda" and called for a standardized training curriculum (Isabirye, 2003). The absence of policy and legislative support

[6] Findings of interviews with farmers and agropastoralist groups, UN agencies, and NGOs and government staff in Moroto.
[7] Interview with Tracy Mitchell, Chief of Party, Mercy Corps and Karamajong agropastoralists.
[8] Interviews carried out with VSF-B, WHH, and IRC (International Rescue Committee), Moroto, June 2016.
[9] Interview with Tracy Mitchell, Chief of Party, Mercy Corps, Kampala.

for para-veterinary professionals in Karamoja for over 20 years indicates that a new, concerted effort to facilitate this support is now needed.

Looking specifically at the financial sustainability of private veterinary services in Karamoja, a simple model of rural veterinary pharmacies or "drug shops" linked to CAHWs evolved in the 1990s. In 2003, private veterinary workers in Uganda reported good links with CAHWs as well as securing contracts from Government for the supply of medicines or other services (AU/IBAR, 2003), while also noting problems such as unfair competition from NGOs, especially during crises such as drought. While there were no private veterinary facilities in Karamoja in 1996 (Catley, 1997), twenty years later, 32 drug shops were present, of which 29 were functional but with "a limited range of veterinary inputs" (VSF-B, 2016). The majority of these facilities fell under associations of CAHWs (41.9 percent), followed by NGO-supported shops (22.6 percent), and private veterinary practitioners (16.1 percent). NGO grants provided the initial source capital for 20 of the shops, while personal savings and loans provided the start-up capital for 10 shops. Qualifications of the shop owners include three veterinarians, one BSc. degree holder, four diplomates, one Animal Health Assistant (AHA), and 20 CAHWs. Nearly 13 percent of the drug shop owners bought drugs from Kenya across the border, and the rest bought them from sources within Uganda.

The Vétérinaires Sans Frontières Belgium (VSF-B) assessment (2016) indicated weaknesses with the performance of drug shops, such as lack of business acumen, distance, supply shortages, or other weaknesses:

> Depending on the location of business the various business models applied varying gross profit margins ranging from 22 percent to 58 percent. This variation was attributed to poor road networks, higher transport costs, insecurity, poor drug supply line and lack of pharmaceutical distributors in the region. 90 percent of the drug shops assessed were incurring loses while only 13 percent with reasonable margins and low overhead costs were making profits.
>
> Despite the colossal financial and logistical support provided by NGOs and Intergovernmental Organizations, the future survival of the Community Animal Health Workers' Association model in the whole region is in jeopardy. 92 percent of drug outlets managed under this model are convulsed by managerial and institutional linkage challenges. Cases of poor financial management, flaws in procurement, poor records keeping, lack of cohesion and fraud were registered in some of these outlets. In some locations such as Rupa, Kalapata, Sidok, Panyangara, Lorengedwat and Kathile the stock levels had diminished to alarming levels with little hope of being replenished. The most promising CAHWs Associations outlets in this regard are JICAHWA-Kotido, SOHDEWA-Tapac and BOCAHWA-Iriri. Operations of this model need to be reviewed appropriately to ameliorate the current trend.

As regards access to vaccines, the report states that the drug shops cannot afford to maintain cold chain facilities, persuading livestock owners to rely on the limited range of vaccines stocked at the District Veterinary Officer (DVO) offices.

When reviewing the CAHW association model in Karamoja, it could be noted that, more widely, associations in pastoralist areas of Africa have a long record of limited success in terms of service delivery. Looking specifically at experiences with livestock user associations (LUAs) to deliver veterinary services in Africa, the following issues were identified more than 10 years ago:

> LUAs are also subject to important constraints, as follows:
> – clinical services constitute a private benefit and LUAs must therefore overcome the fundamental mismatch between collective responsibility and the delivery of a private service;
> – organisational and management problems are common in LUAs, and they often require considerable, long term capacity-building support from external agencies;

> poor financial management and low personal incentives and commitment are often reported and management capacity declines when external support is withdrawn. (Catley et al., 2004)

With these experiences in mind, the question arises as to why the association model continues to be supported in Karamoja. In terms of public sector veterinary tasks, "the Government system of surveillance, movement restriction and vaccination is simply not working because of poor resources, mobility constraints and shortage of technical people" (RLP, 2016; informant interviews[10]). Again, these issues are common to other dryland areas of East Africa, where Government often has limited capacity to conduct disease surveillance and is under-resourced (Leyland et al., 2014). In Moroto, Karamoja, VSF-B noted the types of issues that seem to have been present for over 20 years:[11]

- Livestock owners have the misperception that veterinary service provision is the responsibility of the Government;
- Vaccinations take place on ad-hoc basis, e.g., it took almost a year for vaccines to arrive after the outbreak of FMD in 2013, due to the need for extra budget approval from Parliament;
- Development partners are overwhelmed by requests from DVOs, since there are limited resources available to them; and
- There is reported drug adulteration and misuse by livestock owners, and a view that ticks "have developed resistance to all kinds of sprays."

Community perceptions on existing service providers are also reported in the VSF-B (2016) assessment. Key findings included:

- Regarding the reliability of service providers, CAHWs were ranked top by the sampled households, followed by NGO service providers. Government services were ranked third. This ranking indicates the importance of CAHWs because of proximity and common background despite the reluctance by the authorities to recognize their services;
- Surveys on the costs of veterinary services showed that 57.1 percent of the sampled livestock owners regard services as very expensive and 38.1 percent as expensive. At first sight, these figures imply that the costs are either not affordable relative to the income of herders, leading to herders being reluctant to invest in animal health services and preferring to use traditional herbs, or there is a misconception that service provision is the sole responsibility of the Government. The benefit-cost ratio of veterinary care is often very high. For example, a bull with a current market value of around US$350 could be treated for a life-threatening disease for only US$2–3. Herders are often well aware of this benefit (e.g., Catley, 1997), and so the key question around affordability is not really the level of expense, but the level of benefit relative to cost.

Notably, the recent evaluation of CAHW systems in Ethiopia, Kenya, and South Sudan found that CAHWs were scored moderate to high on affordability by livestock keepers in seven areas (including in Turkana, which neighbors Karamoja), but not surprisingly traditional medicine was the most affordable (Leyland et al., 2014). However, traditional medicine was given low scores for treatment outcomes (recovery from disease), whereas CAHWs received high scores for treatment outcomes.

The notion that the Karamajong are not willing to pay for livestock drugs and veterinary services appears to be an aid-driven phenomenon, as evidence in the mid-1990s shows that herders willingly paid for drugs and services provided by CAHWs (Catley, 1997). Poorly designed humanitarian

[10] Interview with Dr. Emmanuel, VSF-B, Moroto, June 2016.
[11] Ibid.

interventions may have contributed to a preference for free or subsidized drugs and services,[12] along with weak coordination of veterinary projects.

The issues above show that a comprehensive review of veterinary service delivery is needed in Karamoja, one that will lead to a common strategy to be supported by all stakeholders and implemented with strong coordination.

6.2.2 Livestock diseases

A wide range of livestock diseases have been reported in Karamoja since records began and include many viral, bacterial, and parasitic diseases, and some zoonoses. Information on these diseases is available in the form of survey reports and research papers, ethnoveterinary studies, and participatory rankings or scoring with livestock keepers. An initial review of this literature points to at least four main findings:

- Limited information is available on the economic impact of livestock diseases in Karamoja. Although surveys and studies might report laboratory diagnosis of diseases or estimates of disease or parasite prevalence, disease prevalence is not synonymous with impact. Furthermore, much of the literature reports exposure to disease and not disease prevalence (see Annex 1). Animals with the antibody to a particular disease, or infected with certain parasites, may or may not experience disease.
- There is limited analysis of disease control options for specific diseases, especially control strategies based on the epidemiology and economics of diseases, the cost and technical and social feasibility of different disease control options, and the context of veterinary service delivery in Karamoja (section 6.2.1).
- There has been good experience with participatory approaches to understanding livestock diseases in Karamoja, dating back to the onset of CAHW approaches in the early 1990s, and more recently, a study using participatory epidemiology (PE) methods (Bayaruhanga et al., 2015).
- Most of the information deals with cattle diseases; relatively limited information is available on diseases of sheep and goats.

In terms of improved disease control and related livelihoods benefits, it seems that control strategies have not changed very much since the colonial period. Furthermore, although epidemiological and economic information is very useful, this information needs to be combined with analysis of different control options for specific diseases, because a range of preventive or curative methods is often available. Each control option varies in terms of affordability, technical feasibility, local acceptance, and other factors and might be delivered by the private sector, public sector, or via public-private partnerships. In addition, the impacts of some diseases include a mix of direct household-level impacts on production or herd growth and market impacts in terms of movement control, quarantine, or other measures. Another issue is that there is limited evidence to show that existing disease control measures are reducing disease impacts.

The short- to medium-term need is to make further use of participatory epidemiology to examine various livestock disease problems in Karamoja and assess the feasibility of different control options in each case. This process would include categorizing disease control as a public good, private good, or mixed public-private good for each disease and clarifying the roles of different actors in disease control. In common with strengthening veterinary service delivery, this effort requires a high level of coordination across stakeholders.

[12] The *Livestock Emergency Guidelines and Standards* (LEGS, 2014) recommends the use of veterinary voucher schemes where possible, as a means to provide flexible clinical services during drought while also supporting the private sector.

6.3 Water problems

Water shortage is regarded as the second major constraint to livestock production in Karamoja (Mugerwa et al., 2014; RLP, 2016; Burns et al., 2013). Mugerwa et al. (2014) identified six types of water sources for livestock for alternate seasons in Karamoja. The first group consists of boreholes, windmills, and ponds utilized mainly for watering goats, sheep, and donkeys by herders staying close to *manyattas* (settlements). The second group consists of valley tanks, dams, rivers, and riverbeds for general livestock use.

Each type of water source has its own distinct benefits and problems. Boreholes can provide water for most of the year, but mechanical breakdowns are a major problem. For example, in 2010 there were 257, 260, and 317 functioning boreholes in Kaabong, Abim, and Kotido respectively, but there were well over 100 broken or non-functioning boreholes in each district (Burns et al., 2013, citing OCHA, 2010). Other literature reports the existence of 1,271 water sources in the region, 58 percent of which were boreholes (Egeru et al., 2015b). About 79 percent of these water sources were constructed since 2000, but only 11 percent were designed specifically for livestock. It is reasonable to assume that problems with boreholes force people, particularly women, to travel longer distances to collect water from alternative sources. The other problem is the long queues at water sources due to the competition between people and livestock. In some cases, the competition also extends to small-scale irrigation needs.

A FAO (2015c) study on water for production in the region shows that 69 percent of the sample households queue for less than half hour, 26 percent between 30 minutes and an hour, and 6 percent for more than an hour (Table 3). Despite their proximity of within half a km, longer queues take place at shallow wells, boreholes, and tap stands in that order. Major constraints were listed as distance (access) and restrictions in the use of boreholes on those who do not contribute to maintenance (FAO, 2015c).

The other issue is the seasonal availability of water from the various sources. The FAO (2015c) survey shows that boreholes supply water throughout the year, as stated by 81 percent of the sampled households. However, the number of functional boreholes and their distribution in the sub-counties are what determine travel and waiting time at such sources. Valley tanks/dams were rated second in providing water for 9–11 months by only 7 percent of sampled households and for less than six months by 4 percent of sampled households (the variations were due to location of valley tanks and dams). Water pans, farm ponds, sand dams, shallow wells, and tap stands were regarded as supplying water for a shorter period in the year.

Table 3. Water sources, distance, and waiting time

Water source	Distance to water source			Waiting time at water source		
	½ km	1–2 km	>2 km	< 30 m	30 m–1hr	>1 hr
Borehole	61%	37%	2%	58%	35%	8%
Farm pond	83%	17%	-	100%	-	-
River/stream	47%	24%	29%	77%	15%	8%
Sand dam	-	100%	-	100%	-	-
Shallow well	100%	-	-	-	100%	-
Valley dam	50%	25%	25%	100%	-	-
Water pan/pond	50%	-	50%	100%	-	-
Tap stand	100%	-	-	67%	33%	-
Overall	61%	29%	10%	69%	26%	6%

Source: FAO (2015c).

Regarding the efficiency of water sources for various uses, 86 percent of the respondents indicated that boreholes provide enough water for domestic use, 34 percent for livestock, and 11 percent for

small-scale irrigation (for vegetable production by women). Meanwhile, 22, 16, and 8 percent of the respondents considered boreholes to be not providing sufficient water for livestock, domestic use, and irrigation, respectively. Sand dams, valley tanks/dams, and ponds were rated, in that order, as providing sufficient water for livestock by only a small proportion of the surveyed households. These views may relate to accessing these sources in the dry season when the water level is low.

There seem to be only 30 permanent livestock water sources in the region (RLP, 2016). These include 26 dams, but with only 2 of these holding sufficient water. Mugerwa et al. (2014) highlight the importance of dams for livestock by specifically mentioning Kokebe and Nackicumet dams in Napak and Moroto districts, which have only rarely dried up since their construction and have thus become convergence points for livestock from various areas in the dry season. However,

- Nine of the ten dams in Moroto district are located in Rupa sub-county;
- During the study period (October to November 2013), seven of these dams had dried up;
- Minimal water sources exist for livestock in Katikekile, which is classified as a pastoral livelihood zone;
- In Nakapiripirit, three of the four dams are located in Namalu, with one dam located in Lorengedwat and with no dams observed in the other sub-counties; the dam at Lorengedwat was already dry;
- Nackicumet dam still had a considerable volume of water lasting through the dry season;
- In total, four dams are located in Nakapiripirit, three in Napak, eight in Kotido, and ten in Moroto.

Additional observations made by the study team included dam peripheries depicting a very high percent exposure, a very high grazing intensity, and existence of erosion signs through the presence of rills, gullies, and litter dams. The team's conclusion was that, with the exception of Kobebe and Nackicumet dams, water availability in all the other dams was insufficient to cover the forthcoming dry period (in 2013), which would last until the rains started in March 2014. The study team also observed water use and management problems in all dams except at the Nackicumet dam (from which water is piped to troughs, unlike all the other dams) and identified the main reasons as:

- Minimal consultation and lack of community involvement at the time of dam construction provided false hope to communities that everything would be taken care of by the Government, NGOs, or other institutions;
- Vandalism, including the removal of pipes, metals, and other installations, by youth or other groups;
- Lack of initiative to manage existing facilities, since the dams are considered to be the property of Government or the specific NGO that constructed them;
- Direct livestock watering destroying dam embankments, exposing the dam to siltation and erosion;
- Convergence of various pastoral groups including from Turkana on Kobebe dam (that holds water throughout the year), putting pressure on the dam structure;
- Limited capacity for managing expansive dams, such as Kobebe and Nackicumet dams.

Despite substantial investments in developing water sources, the literature highlights the fundamental problems associated with water sources. Key among these are: (i) lack of proper consultation with communities and no capacity building, including the absence of training communities on technical and management issues to enable them to own and responsibly manage the facilities; (ii) the construction of valley tanks and dams that do not hold water for the good part of the dry season, indicating that the design, catchment assessment, site selection, and the construction process were carried out by non-technical people; and (iii) the disproportionate location of valley dams and tanks in selected sub-counties, suggesting that the distribution of water sources is influenced by factors other than need and not done on an equity basis.

By way of recommendations, Mugerwa et al. (2014) suggest water developers address three fundamental issues: (i) an understanding of the rangeland context for effective planning; (ii) rehabilitation and development of water sources, with sensitivity to rangeland dynamics and pastoralists needs; and (iii) an emphasis on securing access through capacity building, user contributions, and strengthening and using customary institutions and practices.

6.4 Feed and pasture shortage

In general, Karamoja has sufficient pasture for livestock for most of the year. Seasonal pasture shortage happens during the dry season, mainly for the following reasons:

- Pasture shortage is evident around *manyattas*, since the available pasture is grazed throughout the year by resident livestock (RLP, 2016);
- Water shortage in the dry season forces herders to congregate their livestock in numbers around valley tanks, dams, and other open water sources, which leads to localized pasture shortage (Egeru et al., 2015b);
- Seasonal livestock migration is influenced more by security concerns than pasture and water availability, restricting the movement of livestock. Similarly, the concentration of livestock in confined spaces during the protected *kraal* system aggravated pasture shortages in the past (FAO, 2014; 2015c).

The above assertions imply that pasture availability is not a major problem in Karamoja, although localized shortages occur during the dry season. Egeru et al. (2015a) examined "piospheric influence" on forage diversity and availability in Karamoja. The term "piosphere" can be defined as an indicator of the localized impact of animal grazing on vegetation and soils. It is a radiating zone of attenuating animal impact away from a "concentrator," e.g., water or mineral licks. Over time, there may be increased soil erosion, reductions in vegetation cover, and changes in soil chemistry within piospheres (Washington-Allen et al., 2013). In the case of Karamoja, protected *kraals* were also a concentrator of animal activity. The Karamoja study on piospheric influence by Egeru et al. (2015a) aimed to describe trends in piosphere development, assess piosphere use and change indicators, and identify herbaceous and woody plant structure in relation to piospheres.

Their findings and observations revealed a low litter cover and high grazing intensity around both waterholes and protected *kraals*, and "despite the pronounced presence (86.3 %) of erosion signs around the waterholes, there was differentiated presence of erosion indicators (rills,[13] gullies, litter dams, and pedestals). For example, "rills were present in only 39.1 % of the waterhole piosphere sampling plots" while in the protected *kraals*, "a low litter cover, high grazing intensity, high percent exposure, as well as presence of erosion indicators were observed." In contrast to the waterholes, "protected kraals depicted a very hard soil surface with a conspicuous absence of gullies" (Egeru et al., 2015a). The authors also stated that distance had a significant and positive influence on herbaceous plant height and grazing intensity as one moved away from the piosphere center, coined by the authors as the "sacrifice zone." Put simply, the presence of more palatable herbaceous plants increased the farther away from piosphere centers, while the dominance of non-palatable herbaceous plants was observed around such centers. Meanwhile, the distribution of woody plants also follows the same pattern, depending on proximity to biosphere centers and as dictated by the presence of gullies, rills, and litter dams, and the compactness and/or the looseness of the soil.

The authors also reviewed the development of piospheres and the associated localized grazing shortages from a historical perspective in Karamoja. According to them, developing artificial water sources in Karamoja began in 1941and increased between 1948 and 1962, continuing into the 1970s

[13] A rill is a shallow channel (no more than a few tens of centimeters deep) cut into soil by the erosive action of flowing water.

and 1980s in response to drought-induced livestock losses. What the authors consider the third phase of water source development took place in response to the 1999–2000 and the 2008–9 droughts, which corresponded with the disarmament program that forced the Government to engage in developing water sources to avert crisis in the protected *kraal* system. This led to an exponential increase, according to the authors, in the number of piospheres consisting of water points and protected *kraals*. The influx of more development aid organizations into the region during this period also accelerated the construction of water points. To summarize, the authors emphasize how significant increases in piosphere centers contributed to the diversity of plant species and localized grazing shortages:

> Spatial distribution shows that a tremendous number of boreholes were drilled to provide domestic water rather than water for livestock and/or for production. Spatial clustering led to the disproportionate distribution of water sources in the sub-region, leading to high grazing intensity and localized degradation (Mugerwa et al. 2014). In addition, several water sources and protected kraals were developed in close proximity to settlements (manyattas) and croplands leading to increased concentration of locus zones with the piospheric concentration effect on grass and woody species gradually and rapidly evolving. It is generally acknowledged that while artificial water sources provide water for domestic stock, native and feral mammalian herbivores, they create grazing locus zones with differentiated impacts on vegetation cover (James et al. 1999). Further, when such developments become pronounced, they interfere with pastoral mobility; this was observed as herders barely move over long distances for extended periods in search of water and pasture. This is because their movements are now being controlled and defined by the locus of waterholes (Egeru et al., 2015a).

Given the prevailing peace and notwithstanding recurrent droughts, the main threat to pasture diversity and availability stems from water shortage rather than pasture shortage in Karamoja. Added to this shortage is the disproportionate distribution of water sources in the region, leading to disproportionate grazing of the available pasture in areas close to water sources. An additional concern is the expansion of farmlands, which could potentially lead to a decrease in browse and pasture availability for livestock. This decrease may seem apparent given the tenfold increase in croplands between 2001 and 2014 in the region (Egeru et al., 2014). While existing household farm sizes and the proportion of cultivated land remain too small to pose a direct threat to pasture diversity and availability at present, the risk is there if the expansion of farmlands continues unabated by increasing numbers of households. The risk will be compounded if large tracts of land are allocated for commercial farms, ranches,[14] mining concessions, and/or parks, as can be observed in neighboring countries. The latter could significantly impact the availability and diversity of browses and pasture for livestock herds.

Despite the risks of loss of rangeland outlined above, the advent of peace has improved the situation by enabling herders to move their livestock to formerly inaccessible areas, at least in the rainy seasons. A study conducted by Egeru et al. (2015c) compared the perspectives of herders versus findings obtained from Normalized Difference Vegetation Index (NDVI) analysis. There were some interesting insights:

- Forage was perceived to be sufficiently available in quantity and quality by 75 percent of the respondents over a 12-month period, with differentiated availability in the livelihood zones and between livestock species. In contrast to other pastoral areas of East Africa (including South Sudan),[15] forage scarcity is uncommon in Karamoja.

[14] There are about 165 large ranches accounting for only 2 percent of total cattle production in Uganda. The largest ranches are about 25,000 hectares, with some 7,000 cattle.

[15] Despite a high level of rainfall, herders in South Sudan cannot access forage in the rainy season until the floods recede after a few months.

- There was a significant relationship between perceived forage availability and long-term mean monthly NDVI dynamics, including a lag time of 2.9 months between rainfall and vegetation response peak periods. Mean monthly rainfall pattern was correlated with perceived forage availability, indicating a deep ecological knowledge among the Karamajong.
- From the perspective of herders, the major drivers of forage availability ($p \leq 0.05$) were perceived to be: length of residence by livestock; frequency of grazing; number of *kraals*; presence of governing rules; presence of conflicts; knowledge of pasture locations; restricted movement; and ease of access to grazing areas.
- On the other hand, forage availability was negatively and significantly ($p \leq 0.05$) influenced by restricted movement and ease of access to grazing areas. Herd size in TLUs and quality of soils were found to positively and significantly ($p \leq 0.1$) influence forage availability.

On another front, the Lorengedwat Research Centre in Moroto is engaged in fodder research with the objective of "improving the rangelands for animals to acquire the minimum nutritional requirements."[16] Funded by the World Bank and initiated in 2013, the program has focused on evaluating five grass and five legume species. Of the few species brought for trials, the Centre learnt later that *Chloris guayana* (Rhodes grass) and local varieties were thriving well in Karamoja. Regardless, of the ten varieties observed under trial, three legumes (Centrocena, Ciratro, and Glyciene) and three grass species (*Chloris gayana,* Brachiaria, and giant Panicum) have been selected on the basis of dry matter and gross energy. The Centre now plans to conduct trials on feed intake, digestibility, and average daily weight gains in bulls that are 6–9 months old. In addition, households owning crossbred cows have started purchasing hay from the Centre, which is also multiplying grass cuttings to distribute to households that have received crossbred heifers from the Government. Some farmers have also enrolled in the "*Chloris* Platform" to promote the cultivation of the species as fodder. Perhaps the Centre needs to focus on multiplying Elephant grass, which does well under the Karamoja agro-climatic conditions, and also on taking the feed intake and live weight gain trial to household/*kraal* level rather than confining it to the Research Centre in a closed circuit system. Meanwhile, the purchasing of hay by households signals that change is slowly but surely coming in Karamoja, at least in major settlement areas.

6.5 Livestock marketing

There are differing views on Karamajong behavior towards livestock marketing. On the one hand, some consider the Karamajong herders' main interest to be accumulating livestock wealth, with little intention to commercialize their assets, reflected in limited transactions in livestock markets (e.g., Mercy Corps, n.d.). This school of thought also sees the Karamajong as unresponsive to prices and only interested in selling old male and female cattle that fetch low prices (Mercy Corps, n.d.; FAO/GIEWS, 2014). Typically, this view leads to calls to develop market infrastructure and information systems, and sees weak livestock marketing as one of the major development constraints in Karamoja. In contrast, studies on pastoralism in Africa dating back to the 1970s explain the economic logic of herd growth to build financial capital and the rationale for limited sales to meet immediate cash needs until a certain herd size is attained (e.g., Behnke, 1987; Barrett et al., 2006). In Karamoja, this perspective was described recently by the Resilience Learning Project (RLP, 2016). The project views herders' livestock marketing behavior as a rational resilience strategy given a livestock production system that is characterized by "boom and bust" cycles. RLP also argues that the Karamajong are responding reasonably well to market opportunities as and when they happen, in a methodical way, by selling the right numbers of animals for their immediate cash needs. In between, we also find livestock market assessments conducted as part of the seasonal food security assessments. Such reviews do not delve into the marketing behavior of herders but provide assessment figures on livestock and cereal price fluctuations and terms of trade to highlight the prevailing food security status in Karamoja. These food security assessments reflect a fundamental

[16] Interview with Dr. Paul Okullo, Director, Lorengedwat Research Centre, Moroto, June 2016.

aspect of livestock management amongst pastoralists, which is the direct consumption of livestock products:

> The basic economics of pastoralism combine the need to manage risk and increase financial assets in a context of uncertain rainfall and therefore uncertain access to pasture and water for livestock. In addition, pastoralists consume foods that are sourced directly from livestock, especially milk, or they obtain other important foods, such as cereals through livestock sales. Therefore, pastoral livestock ownership and production is not only a matter of managing financial assets, but also managing household food security. (Catley et al., 2016)

Recent reviews and assessments on livestock marketing systems and behaviors in Karamoja include:

- FAO/GIEWS special report by the Karamajong Livestock and Market Assessment Mission (2014);
- Mercy Corps/USAID Cattle Market Assessment Report of the SUSTAIN Project (n.d.);
- RLP Karamoja Livestock Market Assessment (2016).

Also relevant to Karamoja is the nationwide report titled "Identification of Livestock Investment Opportunities in Uganda" (Agriterra, 2012).

The FAO/GIEWS Mission covered various aspects of livestock production in the region, with a brief assessment of livestock marketing that focused on the prevailing livestock market status during a field visit in February 2014. At that time, the Mission reported a favorable terms of trade in general for pastoralists since 2011, following an increase, albeit an irregular one, in livestock prices due to improved body conditions of livestock. Prices were said to be 54, 57, and 69 percent higher for heifers, goats, and sheep respectively in 2013 relative to 2011. The Mission also reported slower increases for Moroto and Kaabong markets, whereas in Nakapiripirit prices remained the same for goats and sheep and were reduced for heifers in the same period. A substantial reduction was also reported by the Mission in livestock prices in Kaabong due to reduced demand from South Sudan. The Mission underlined how price volatility over time was indicative of considerable differentials between markets, owing to the compound effects of insecurity, inaccessibility, and changing demands. The Mission also added that "price increases were reported not to stimulate supplies because of the limitations on the numbers of animals households sell to avoid the diminishing of stock." Also reported was the interest of Karamajong herders in buying heifers from outside the region for breeding purposes, a view supported by the RLP assessment in 2016.

The Mission's field observations imply that Karamajong livestock markets are not so responsive to the functions of supply and demand but more influenced by the levels of security and accessibility, changing demand levels, and the limitations on the numbers of animals to sell to avoid diminishing of stock. Viewed from this perspective, Karamajong herders need to juggle where, when, and how many livestock to sell relative to their counterparts in secured and accessible environments. Meanwhile, household behavior of not responding to prices—either because they do not want to sell more animals to accumulate wealth (Mercy Corps, n.d.) or due to the limitations on the numbers of animals they sell to avoid diminishing of stock (FAO/GIEWS, 2014)—needs to be scrutinized from a different perspective. Critically, due to the economic logic of herd growth as a core livelihoods strategy, price increases mean that pastoral or agropastoral households have to sell *fewer* not more animals to meet immediate cash needs. In this context, one would expect less supply to the market when prices go up, either to progressively minimize stock depletion (a view also shared by RLP (2016)) or to increase livestock wealth accumulation. This strategy also allows the new price to be effectively applied in the market for as long as the demand continues. On the other hand, increasing supplies in response to price would automatically trigger a decrease in livestock prices; this simple fact seems to be missed by those who describe the Karamajong as unresponsive to price.

In addition, the diminishing household herd size the Karamajong have experienced in the last two decades or so due to insecurity and raids, livestock disease, protected *kraals*, and droughts makes them wary of disposing of the limited animals they own in an uncertain future. In this situation, focusing on herd growth is logical. The RLP assessment emphasizes this point by stating that "extensive livestock operations generally do not respond to market prices by increasing or decreasing production" (RLP, 2016).

The Mercy Corps study (n.d.) covered the three districts of Kaabong, Kotido, and Abim. It aimed to better understand how the marketing system functioned and how to promote livestock supplies (in quantity and quality) for sale. It also aimed to assess if commercial destocking was feasible during drought. The assessment by RLP (2016) covered specific questions about market performance, conduct, supply chain, market actors, transaction volume, margins, and so on in the Karamoja region. The findings of the two papers are summarized below.

Both papers agree that the key role of the production system is to accumulate wealth in the form of livestock and sell a limited number of animals when cash is needed. However, RLP (2016) adds that pastoralists also "trade up" by selling slaughter bulls to purchase heifers from outside the region (including Kenya) for breeding purposes, indicating the preference of some Karamajong herders for injecting "new blood" into their herds. After establishing that livestock are not kept for commercial reasons, the Mercy Corps report considers why non-reproductive cattle are kept long after they should have been sold. According to this report, "the key market issue is the limited supply of cattle given the potential for production," i.e., considering the rangeland and livestock resources. In contrast, RLP explains the rationale behind the marketing behavior of Karamajong herders: "the amount of money needed, not price, is the primary consideration when animals are to be sold to meet cash need (RLP, 2016)," which implies fewer animals are sold when the price is high and more animals are sold when the price is low. The same report also notes how Karamajong herders respond to price when the objective to sell animals is to "trade up;" they sell slaughter bulls in good condition immediately after the rains in order to buy breeding heifers from outside. As noted above, marketing behavior is also affected by household food security objectives and the need to maintain sufficient animals to provide milk for direct household consumption.

According to both sources, livestock in Karamoja are sold individually through direct negotiation between buyer and seller. This absence of "middlemen" (*dilals*) is a unique feature of the marketing system and differs from pastoral markets in Kenya, Ethiopia, Somalia, and Tanzania (RLP, 2016). Women have limited roles in the marketing of all animals except chickens. The range of traders include: (i) producer/traders usually trading in *manyattas,* some of whom may graduate to transacting in local markets as they accumulate cash; (ii) local traders (buying in one and selling in another market); and (iii) regional or export traders.

According to Mercy Corps (n.d.), regional traders, largely based in Teso, are engaged in exporting to South Sudan, Kenya, and end markets within Uganda. Kenyan traders are also reported to operate in Karamoja and trek purchased animals to Turkana or vice versa. Ugandan regional/export traders are reported to practice fattening by feeding purchased livestock for 15–20 days on good pasture. They also vaccinate and treat animals before selling to end markets. Such traders reportedly operate in alliance with local traders, who purchase animals on their behalf. Animals destined for South Sudan and end markets are usually trucked from Karamoja. Problems faced by regional and export traders were reported to be the low quality of Karamoja cattle, poor roads, livestock deaths on trucks, fees and taxes, exchange rate fluctuation (particularly in South Sudan), and price volatility in the end markets. The assessment also shows that most traders operate on low profit margins, except those who used to export to South Sudan.[17] It also appears that most local traders are unaware of the limited financial services (small loans) that are available in the region, and the few who are aware are

[17] This was before the conflict that erupted in 2014 and subsequently resulted in the rapid devaluation of the South Sudanese Pound.

concerned about getting into debt. Some regional/export traders who have taken out loans seem to have had bad experiences, while others are interested in accessing such loans to increase their volume of trade. According to Mercy Corps, there are traders associations in Kotido (registered in 2007 with 250 members) and also in Kaabong (with 500 members). Their financial resources are limited to their annual subscriptions (UGX20,000 or about US$6) in both cases, and both associations focus on applying for contracts and grants. Mercy Corps reports that the association in Kotido received a grant of UGX128 million (US$38,000) from Oxfam for training and business skills development, after which two senior managers were given notice on suspicion of mismanagement. This raises a question as to where the priorities should be—supporting traders or improving the quality of livestock supplied to markets through value addition, e.g., by working with some producer groups.

Despite some assumptions that Karamajong herders do not sell large enough numbers of livestock, the off-take volume from the region is supplying a growing number of end markets, in addition to meeting annual consumption needs of the region and the main town, Moroto. Other end markets supplied by Karamoja include Lira, Soroti, and Juba (Mercy Corps, n.d.), Mbale, Tororo, Busia, Kampala, and Kenya (RLP, 2016). According to one local informant,[18] Karamoja is now the major cattle supplier to eastern Uganda, extending from Teso to Jinja. As stated in both the Mercy Corps and RLP reports, market data are hard to come by in Karamoja, and so precise volumes of sales and price trends are not known. However, observation alone shows that around 10–15 truckloads, each carrying about 15 cattle, are shipped from Moroto market alone on a weekly basis, with an average supply of 300 to 400 cattle per weekly market day.[16]

Livestock export figures from Uganda to Juba (excluding poultry) provide insights into the exports originating from Karamoja, since Karamoja and Teso are the major supply sources to this market (only a few Ankole cattle go to Juba from other areas of Uganda). Both Karamoja and Teso were responding well to the growing demand in Juba (see Table 4) until the rapid decline in the value of the South Sudanese Pound, indicating that Karamoja herders respond to prices. Unfortunately, this market has been lost due to the deteriorating political and economic situation in South Sudan.

Table 4. Live animal exports from Uganda to Juba, South Sudan, 2013–2015

Livestock type	2013	2014	2015
Cattle	7,897	27,816	19,338
Sheep and goats	12,581	113,840	149,526
Poultry	17,433	88,786	39,824

Source: FAO South Sudan (2016a).

In terms of price trends, these are difficult to assess in the absence of market data (Mercy Corps, n.d.; RLP, 2016). Unpublished price data from Mercy Corps in 2013 do not show significant monthly price fluctuations during 2013, which is atypical of price trends in pastoral/agropastoral areas. In the absence of price data, both reports list factors that might influence price patterns by increasing demand or supply in general terms. RLP states that Karamajong animals are "highly regarded (by buyers) for…their carcass yield, condition and quality of meat…and that slaughter bulls are the most dynamic of the cattle market and slaughter goats are the most dynamic of the shoats market" (RLP, 2016). In contrast, the Mercy Corps report cites Teso traders complaining about the low quality of Karamajong cattle brought to the market, stating that they are thin, sometimes diseased, tattooed, and often old. If so, it is unclear why increasing numbers of these traders are visiting the markets. Both reports provide the breakdown on end prices and partitioning among the various supply chain actors (see the reports for more details).

Measures recommended by the two reports to make the livestock marketing system more dynamic and streamlined begin by focusing on the production aspects, for understandable reasons. The

[18] Interview with Director of the Lorengedwat/Nabuin Research Centre.

priority of both assessments is improving animal health services in Karamoja to minimize livestock mortality and morbidity, in order to produce more marketable animals. RLP (2016) also recommends improving livestock water sources, followed by feed development and securing land tenure for producers to access productive rangelands. Specific market-linked recommendations include developing a series of value chains for forage, poultry, milk and milk products, and meat. Other recommendations include reviewing and updating the existing policy framework as it relates to Karamoja and setting up a knowledge management resource center for the region. The Mercy Corps report identifies feed improvement as the most important input to any livestock production system, although priority has to be given to animal health service because of the specific situation in Karamoja. Additional recommendations include providing financial services for producers through Village Savings and Loans Associations, and for traders to facilitate working capital. The Mercy Corps report also recommends providing information and knowledge to producers and service providers to stimulate behavioral changes in the production, service, and marketing aspects of the system. Infrastructural improvements were recommended on roads and water sources. With regard to market infrastructure, the report recommends nothing more than the provision of loading ramps, where necessary; this in line with impact assessments of new livestock market infrastructure in Ethiopia (PLI Policy Project, 2010). Interestingly, the Mercy Corps report does not envisage value addition activities for the next 10 to 20 years because of poor roads, power shortages, lack of cold chain facilities, etc.

On a related note, an investment study on the livestock sector in Uganda as a whole reports a per capita beef consumption of only six kg in Uganda, which is about half that of Kenya (and South Africa) (Agriterra, 2012). The report predicts an increasingly strong demand for meat due to growing urbanization, increasing purchasing power, changes in consumption habits, and population growth. The study further notes that supply is severely constrained by the dominance of subsistence production systems and slow-maturing indigenous breeds. Regardless, this projection provides some scope for increased cattle marketing opportunities from Karamoja in the short to medium term. However, the study also indicates a growth in ranching, given that the existing 165 large ranches in Uganda account for only about 2 percent of the cattle production, and that the largest ranch of 25,000 hectares holds only 7,000 cattle. While the study suggests that the capacity of the existing ranches can accommodate more animals, there is a risk that new commercial ranches might take over prime community grazing land in areas such as Karamoja. This risk becomes apparent when considering the specific investment opportunities identified by the study for the beef sector: investments in combined abattoir and processing centers; commercial ranching; commercial feedlot; butcher equipment provisions; and improved breeding services. Problems with commercial livestock ranching in Uganda are not new, and detailed case studies are available, including in Karamoja (Muhereza and Otim, 2002).

7. Policy issues

In common with Ethiopia and Kenya, major policy issues in the Karamoja context revolve around the promotion of settlements versus pastoralism and the allocation of tracts of grazing land for national parks, mining concessions, and other development projects, while the status of communal pastoral land remains uncertain and without secured land tenure rights. At the heart of this controversy is the longstanding misperception among central policy makers that pastoralism is not a viable mode of livelihood compared to settled farming. This misperception, combined with the insecure land tenure arrangements in pastoral areas, leads to the appropriation of large tracts of land in the name of national, corporate, or individual financial interests. In Karamoja, the misperception about the non-viability of pastoral livelihoods has been reinforced by the persistent conflict in the region, which finally led to the disarmament campaign, which lasted until 2011. Authorities also see settled populations as more easily controlled, and this notion provides another layer of justification for settlement at the highest levels. In fact, the challenges faced by the Government during the disarmament campaign were such that "cattle were considered as the curse of Karamoja"[19] by the authorities, prompting a call for sedentarization from central Government. There was a perception that the "'dangers' of pastoralism in Karamoja more than outweigh the benefits" (Bushby and Stites, 2016).

Levine states that "the Government of Uganda's policy remains both explicitly stated and is clearly implicit in its development programming: pastoralism and agro-pastoralism are not viable, and populations should be supported to take up settled farming instead" (2010). This is supported by reference to the five-year (2009–2014) budgetary allocation for the Food Security Action Plan for Karamoja by the Government. Of a total budget of around US$40 million earmarked for this program, less than 5 percent was allocated for livestock. Even within this minimal allocation, only 1 percent of the total budget was relevant for supporting the local livestock rearing system (i.e., for animal health provision), while the balance was earmarked for introducing improved breeds and promoting camel and ostrich farming. Of these approaches, only camel rearing is relevant to Karamoja herders. Notably, agricultural land increased tenfold in Karamoja between 2001 and 2014 (Egeru et al., 2014), but many people who took up farming were those with no livestock to sustain themselves, for various reasons (Ngilu, cited by Levine, 2010). The implication is that whereas farming is a complementary livelihood for agropastoralists, it is something of a last resort for people with no livestock in Karamoja.

Levine confronts head on the perception that livestock-based livelihoods are not viable and pastoralists are poor. He asserts that "even in a year with almost complete crop failure, the majority of households in the agro-pastoral and pastoral areas of Karamoja were able to cope without external assistance" (Levine, 2010). Taking his argument further, he emphasizes that "for as long as livelihoods are livestock dependent, then, we can say that there have been no recent droughts in Karamoja. There have only been 'droughts' for people who are settled and who rely on farming" (Levine, 2010).[20] He also questions the rationale for the food aid that Karamoja has received for the last three decades (or more): "Karamoja does not suffer from frequent droughts, natural disasters are rare, and the populations there do not need repeated short term or protracted food aid to meet their needs" (Levine, 2010). He points out how intermittent attempts over the years to move towards a policy of settlement in Karamoja have been either knowingly or unwittingly supported by development aid programs, with food aid, water development in settled areas, and support to settled

[19] Interview with a NGO staff member in Moroto, name withheld.

[20] Note that this line of thinking is not new. In the late 1980s it was noted that "annual rainfall looks respectable but monthly and annual variations are large, precipitation is localised and rainfall incidence is sporadic such that there are often prolonged dry spells during the growing season. It is this variability in rainfall that limits crop production in most parts of Karamoja, and crop failure is frequent. A report by FAO cites 50-100% crop failures in 1924, 1927, 1930, 1944, 1947, 1950, 1952, 1955, 1957, 1968, 1971, 1975 and 1979/80, and agriculturalists expect one year in four to be a year of drought" (Sandford, 1988).

farming systems undermining mobile livestock production. For example, the UNDP-financed Karamoja Private Sector Development Programme Centre was launched in collaboration with the GoU "to promote alternative livelihoods as a means to discourage cattle raiding and to diversify economic activity in the region" (Bushby and Stites, 2016, citing Fereri, et al., 2011). The World Food Programme (WFP) has also supported various GoU sedentarization initiatives and has been working in Karamoja for over 40 years (Bushby and Stites, 2016, citing Human Rights Watch, 2014).

Levine (2010) argues that misperceptions about the viability of pastoral and agropastoral livelihoods partly originate from surveys that equate poverty with low cash expenditure, leading to the conclusion that income poverty is high in Karamoja. If household income is defined not as cash (through-flow) but as a stream of wealth entering the household (i.e., increases in assets, such as livestock herd, as income), then the numbers tell a different story. He supports his argument by computing the stream of wealth entering pastoral and agropastoral households to make a point that such households are no poorer than their equivalents in other rural parts of Uganda. The computation was done for the reference year 2008–9, considered a bad year with total crop loss. Agropastoralists and pastoralists were able to cope without receiving any food aid during the reference 12-month period. Although a few extra livestock were sold, herd depletion was limited, even for the poor. These arguments fit with earlier work on measuring poverty in pastoralist areas and the importance of viewing livestock assets as a critical measure of wealth over cash income (Little et al., 2008).

The RLP (2016) assessment also reports policy concerns and that

> current policies are not enabling increased production and productivity, and more fundamentally tend to disadvantage the livestock sub-sector, reflecting anti-pastoralist bias, and lacking a poverty focus. The policy framework is increasing pastoral vulnerability and the prevailing political and enabling environment works against pastoralism mainly due to the longstanding attempt to promote crop production, which is essentially an anti-pastoralism policy, as reflected by successive regional development programs – such as the KIDP [Karamoja Integrated Development Programme] and the subsequent KIDP II…the few livestock policies which are being promoted largely support settled livestock production, are not poverty focused and have not gained any traction with livestock producers, settled or pastoral and promoting crop production in areas where rainfall is marginal and variable will likely increase vulnerability.

The report makes a point in that critiques of the weak or unfavorable policy environment have not yet led to much-needed changes in policy and strategy, and therefore elements which contribute to the policy-making environment may first need to change before the specific policies themselves can be revised. The report makes a series of recommendations along this line (see the report for details).

Another area of concern is securing land rights for pastoral and agropastoral communities. Levine (2010) warns that "a longer term economic transformation in Karamoja can only happen when difficult issues are tackled, in particular when the land rights of the Karamajong are recognised and respected." The RLP (2016) assessment further stresses this point by stating that access to productive rangeland is the only guarantee to livestock development in Karamoja, and therefore securing land rights is critical for pastoralists. The report raises the concern that traditional mobile pastoral production units are facing livelihood challenges from "the expansion of cultivation, the award of mineral exploration concessions, the gazetting of conservancy areas, and the allocation of tenure rights to individuals" (RLP, 2016). The report also warns that the continuation of this trend will "progressively decrease access to land, forage and water resources, generate conflict, and compromise the livestock sector productivity" (RLP, 2016). The report recommends the formal recognition and allocation of tenure rights to the pastoralists who have long been the users and

managers of the land, enabling them to invest in and operate improved production systems in the future through appropriate policy measures.

A shift in pastoral policy?

In April 2016, an IGAD ministerial meeting was held in Kampala to discuss the contribution of livestock to the Gross Domestic Product (GDP) of member states. The meeting aimed to support IGAD member states to take proper account of the contribution of the livestock sector to their national economies, and to influence decision makers in making budgetary allocation commensurate with the sector's economic contribution. IGAD's revised estimates put the contribution of livestock to the national GDP of Uganda at 3.2 percent (about US$526 million), larger than the GDP derived either from cash crops or fishing, marginally smaller than forestry, and about a quarter of the value of food crop production.[21] A speech by the State Minister of Agriculture of Uganda during this meeting indicated that, because of the efforts to support the dairy sector, national milk production has risen from 400,000 to 2 million liters per year, with dairy products being exported to Asia and the US. The State Minister also added that "this was possible because if you put money on livestock, you get immediate results; we now want to work on the beef sector, because livestock means money and a World Bank study shows that the majority of households with livestock are above the poverty line." This acknowledgment implicitly extends to the pastoral mode of production because even if working "on the beef sector" implies a commercialized approach (ranches, feedlots, and processing), this approach can only materialize if there is a continuous supply of livestock from the primary production centers such as Karamoja. In other words, drawing lessons from Sudan, Somalia, and Ethiopia, in countries like Uganda and Kenya commercialized livestock production can only succeed if the pastoral production system survives and thrives, and continues to feed the value addition process.

Further indications of an attitudinal change are evident in the new World Bank-financed Regional Pastoral Livelihoods Resilience Project (RPLRP). The five-year project aims to improve the resilience of pastoralists in Kenya and Uganda, and from the total project budget of US$79.6 million, US$26.1 million is allocated for Uganda. Contrary to policy narratives for Karamoja, the World Bank project appraisal document explicitly recognizes the importance of pastoralism in dryland areas as "a major source of food and cash income, as suppliers of inputs for further production, playing a crucial role in maintaining and even improving the eco system, contributing to soil fertilization, water infiltration and maintaining biodiversity" (World Bank, 2014). The appraisal further notes that the growth of the livestock sector from 2001 to 2010 averaged 3 percent per year in Uganda, consistently higher than other agricultural sub-sectors. The following extract from the appraisal document affirms how much Uganda may have shifted in terms of support to livestock development in Karamoja:

> Seasonal and cross-border mobility is a crucial feature of pastoralism allowing pastoralists to carry out livestock-based livelihoods in the ASALs [Arid and Semi-Arid Lands], to cope with droughts and to manage conflicts over natural resource use. The ecosystems from which pastoralists derive their livelihoods often go beyond national borders as do the market networks for livestock that provide them with opportunities for income growth. The proposed Regional Pastoral Livelihoods Resilience Project (RPLRP) seeks to develop regional solutions to challenges faced by pastoralists who reside in the ASALs of Kenya, Uganda and potentially other countries from the HoA [Horn of Africa] such as Ethiopia or South-Sudan, to enhance opportunities for livelihood development available to them. Within the framework of RPLRP, the project has two phases for supporting a set of activities to build the resilience of pastoralist livelihoods. The first phase of the project will provide a comprehensive package of investments and services to targeted cross-border clusters across Kenya and Uganda as well as a set of strategic investments and activities to address regional issues in selected counties/districts of these two countries. IGAD and the two countries will

[21] IGAD Ministerial and Uganda Government Meeting on Contribution of Livestock to the GDP of IGAD Countries, April 20–22, 2016, Munyonyo Resort, Kampala, Uganda.

> coordinate to deliver this comprehensive package at the regional and national level in a consistent manner. Other countries in the HoA, such as Ethiopia, South Sudan or Somalia would join in later phases. (World Bank, 2014)

Details of the appraisal show that in Uganda, the project will target the Karamoja region, the neighboring four districts in Teso region, and one district in Sebei region. The Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) will implement the project. The project targets to directly benefit 135,000 households (93,000 in Kenya, 42,000 in Uganda) and more than 285,000 households if indirect beneficiaries are included. The project is composed of five components:

Component 1—Natural resource management
1.1 Water resource development (13 valley tanks in Uganda and capacity building on appropriate use, management, repair, and maintenance)
1.2 Sustainable land management in pastoral and agropastoral areas (soil conservation, forage storage structures, policy harmonization, participatory rangeland management)
1.3 Securing access to pastoral-related natural resources (prevention of conflicts and building peace between communities)

Component 2—Market access and trade
2.1 Market support infrastructure and information system (integration of the national livestock market information system with the regional level; build, rehabilitate, and equip about 28 primary market infrastructures,[22] regional and satellite laboratories)
2.2 Livestock value chain support and improving livestock mobility and trade (developing selected livestock-related cross-border value chains, training on cooperative management models, and marketing, etc.)

Component 3—Livelihood support
3.1 Livestock production and health (region-wide harmonized vaccination programs for priority diseases, development and harmonization of breeding strategies, building of breeding centers, etc.)
3.2 Food and feed production (fodder bulking and conservation, small-scale irrigation and water management schemes for crop and fodder production)

Component 4—Pastoral risk management
4.1 Pastoral risk early warning and response system
4.2 Drought disaster risk management (training and availing contingency funds for community-managed disaster risk reduction)
4.3 Contingency emergency response (re-allocation of project funds following an adverse natural event to mitigate, respond, recover, and re-construct)

Component 5—Project management and institutional support

The acceptance of the IGAD project indicates a positive shift in thinking around pastoralism and livestock development in Uganda. As a cross-border project covering two countries, this is a pilot project. The next phases of the project are expected to expand to Ethiopia, South Sudan, and Somalia in an attempt to allow cross-border movements of pastoralists and livestock in a similar manner to that of the West African Sahelian countries. The overarching objectives are to enhance cross-border livestock trade, goods, and services, to enable livestock movement for grazing, and to harmonize regional vaccination programs for priority diseases. As a regional program, IGAD will lead the coordination of the national and cross-border activities, indicating that Uganda will be expected to follow a regional pro-pastoral approach under IGAD.

[22] Various evaluations show that building livestock market infrastructure (outside of loading ramps) in pastoralist areas has little impact on volumes of livestock sales or prices, e.g., see PLI Policy Project (2010).

8. Conclusions and recommendations

Karamoja's long history of conflict, under-development, and inappropriate policy and programs has been well documented (Stites and Akabwai, 2009). Various factors have combined to turn many former livestock keepers into farmers, and yet livelihoods based on agriculture alone are inherently more risky than agropastoralism or pastoralism due to the variability of the region's rainfall. Overall, there has been under-investment in livestock development, underpinned by policy narratives that have consistently overlooked the economic basis of the pastoral/agropastoral system and the contribution of this system in Karamoja to the local and national economy. Despite this history, the livestock system in Karamoja has proven to be remarkably robust. Livestock markets are active, and Karamoja is likely to supply increasing numbers of animals to meet growing demands associated with human population growth and urbanization in the region, in Uganda, and in neighboring countries. Recent shifts in policy narratives and the emergence of the RPLRP under IGAD seem to provide opportunities to provide serious support to livestock development in Karamoja. The literature review points to the following key programming and policy areas:

1. Veterinary services and livestock disease control: Livestock disease is widely reported as the main constraint to livestock production in Karamoja. Any attempt to support livestock-dependent communities should include strengthening the existing system of private veterinary service providers, with appropriate regulatory support from Government and, essentially, good coordination. There is also a need to better understand the impacts of livestock diseases and support multi-stakeholder analysis of disease control options, leading to control strategies that suit the Karamoja context and can be sustained. The potential for the EU-financed Uganda Veterinary Association Privatization Scheme to support veterinary service development in Karamoja needs to be examined. The examination should include a review of past privatization initiatives dating back to the 1980s. Overall, there needs to be a single strategy for veterinary service development in Karamoja, with all veterinary support from Government, NGOs, and UN agencies aligned to this strategy.

2. Water and livestock feed: These areas are covered by the new RPLRP, but there will need to be good coordination with a range of other actors and programs involved in water and feed development, as well as reviews of good practice and experiences from Karamoja and elsewhere. Although there have been many livestock feed and water projects in East Africa's drylands over the years, there are relatively few evaluations or impact assessments available.

3. Market-oriented livestock production pilots: The potential for market-oriented livestock production (value addition) in Karamoja, e.g., feed processing, fodder production, feedlots, trade linkages, etc. using pilot projects with good evaluation should be explored before scaling up is undertaken.

4. Policy review: There is a need to jointly assess policy constraints against key regional policy documents, such as the African Union's Policy framework for pastoralism in Africa (AU, 2010) and various IGAD policy documents, leading to the formulation of a pro-pastoral policy or strategy in Uganda. Uganda's policy makers, including technical experts in MAAIF, will need to work with the RPLRP/IGAD to maintain policy dialogue and lesson learning.

References

ACF (Action Contre La Faim). 2008. Food Security & Livelihoods Assessment: Kaabong & Moroto, Karamoja, August – September 2008. ACF, Kampala. http://www.actionagainsthunger.org/sites/default/files/publications/ACF-FSL-Uganda-Karamoja-Kabong-Moroto-2008-09-EN.pdf (accessed May 2016).

Action Against Hunger. 2013. Nutrition Surveillance Data Analysis, Karamoja, Uganda, December 2009 – May 2012. Action Against Hunger and Government of Uganda, Kampala. http://www.actionagainsthunger.org/sites/default/files/publications/Nutrtion_Surveillance_Data_Analysis_Uganda_08.2013.pdf (accessed May 2016).

Agriterra. 2012. Identification of Livestock Investment Opportunities in Uganda. Agriterra, Arnhem. https://agriterra.org/assets/uploads/15820/Livestock%20market%20study.pdf (accessed May 2016).

Anon. 2001. Animal Health Service Delivery in Pastoralist Areas. Report of a Workshop Held in Eneku Training Village, Soroti, Uganda, September 4–6, 2001. Department of Veterinary Medicine, Makerere University, Kampala. http://sites.tufts.edu/capeipst/files/2011/03/Makerere-University-Workshop.pdf (accessed May 2016).

AU (African Union). 2010. Policy Framework for Pastoralism in Africa: Securing, Protecting and Improving the Lives, Livelihoods and Rights of Pastoralist Communities. African Union, Addis Ababa. http://www.au.int/en/documents/30240/policy-framework-pastoralism-africa-securing-protecting-and-improving-lives (accessed May 2016).

AU/IBAR (African Union/Interafrican Bureau for Animal Resources). 2003. Private Veterinary Practice in Pastoralist Areas of Eastern Africa. Report of a Regional Workshop Held in Nakuru, Kenya, August 6–9, 2003. AU/IBAR, Nairobi. http://sites.tufts.edu/capeipst/files/2011/03/AU-IBAR-Nakuru.pdf (accessed May 2016).

Barrett, C., M. Bellemare, and S. Osterloh. 2006. Household-level Livestock Marketing Behavior among Northern Kenyan and Southern Ethiopian Pastoralists. In *Pastoral Livestock Marketing in Eastern Africa: Research and Policy Challenges,* edited by J. McPeak and P. Little, 15–38. Rugby: Practical Action Publishing,

Bayaruhanga, C., M. C. Oosthuizen, N. E. Collins, and D. Knobel. 2015. Using Participatory Epidemiology to Investigate Management Options and Relative Importance of Tick-borne Diseases amongst Transhumant Zebu Cattle in Karamoja Region, Uganda. *Preventive Veterinary Medicine* 122:287–297.

Behnke, R. H., 1987. Cattle Accumulation and the Commercialization of the Traditional Livestock Industry in Botswana. *Agricultural Systems* 24:1–29.

Burns, J., G. Bekele, and D. Akabwai. 2013. Livelihood Dynamics in Northern Karamoja: A Participatory Baseline Study for the Growth, Health and Governance Program, Mercy Corps. http://fic.tufts.edu/publication-item/livelihood-dynamics-in-northern-karamoja/ (accessed May 2016).

Bushby, K., and E. Stites. 2016. Resilience and Risk in Pastoralist Areas: Recent Trends in Diversified and Alternative Livelihoods in Karamoja, Uganda. In *Resilience and Risk in Pastoralist Areas: Recent Trends in Diversified and Alternative Livelihoods.* USAID/East Africa Resilience Learning Project, Nairobi. http://pdf.usaid.gov/pdf_docs/PA00M1PZ.pdf (accessed May 2016).

Catley, A., 1997. A Review of the Oxfam UK/Ireland Kotido Livestock Development Project (Animal Health Component), Kotido District, Karamoja. Consultancy Report for the Renewable Natural Resources Sector, Overseas Development Administration (UK), Uganda. Vetwork UK, Musselburgh.

Catley, A., and Y. Aklilu. 2013. Moving Up or Moving Out? Commercialization, Growth and Destitution in Pastoralist Areas. In *Pastoralism and Development in Africa: Dynamic Change at the Margins*, edited by A. Catley, J. Lind, and I. Scoones. Abingdon and New York: Routledge.

Catley, A., J. Lind, and I. Scoones. 2016 (in press). The Futures of Pastoralism in the Horn of Africa: Pathways of Growth and Change. *Office international des epizooties revue scientifique et technique* 35 (2).

Catley, A., T. Leyland, J. C. Mariner, D. M. O. Akabwai, B. Admassu, W. Asfaw, G. Bekele, and H. Sh. Hassan. 2004. Para-veterinary Professionals and the Development of Quality, Self-sustaining Community-based Services. *Office international des epizooties revue scientifique et technique* 23 (1): 225–252. http://sites.tufts.edu/capeipst/files/2011/03/Catley-et-al-OIE-Apr-04.pdf (accessed May 2016).

Egeru, A., O. Wasonga, J. Kyagulanyi, G. J. M. Majaliwa, L. MacOpiyo, and J. Mburu. 2014. Spatio-temporal Dynamics of Forage and Land Cover Changes in Karamoja Sub-region, Uganda. *Pastoralism: Research, Policy and Practice* 4:6. https://pastoralismjournal.springeropen.com/articles/10.1186/2041-7136-4-6 (accessed May 2016).

Egeru, A., O. Wasonga, L. MacOpiyo, J. Mburu, J. R. S. Tabuti, J. Kyagulani, and M. G. J. Majaliwa. 2015a. Piospheric Influence on Forage Species Composition and Abundance in Semi-arid Karamoja Region, Uganda. *Pastoralism: Research, Policy and Practice* 5:12. https://pastoralismjournal.springeropen.com/articles/10.1186/s13570-015-0032-y (accessed May 2016).

Egeru, A., O. Wasonga, L. Macopiyo, J. Mburu, and M. Majaliwa. 2015b. Abundance and Diversity of Native Forage Species in Pastoral Karamoja Sub-region, Uganda. *African Study Monographs* 36 (4): 261–296.

Egeru, A., O. Wasonga, J. Mburu, E. Yazan, M. Majaliwa, L. Macopiyo, and Y. Bamutaze. 2015c. Drivers of Forage Availability: An Integration of Remote Sensing and Traditional Ecological Knowledge in Karamoja Sub-region, Uganda. *Pastoralism: Research, Policy and Practice* 5:19. https://pastoralismjournal.springeropen.com/articles/10.1186/s13570-015-0037-6 (accessed May 2016).

FAO (Food and Agriculture Organization). 2014. Assessment of Milk and Vegetable Market Systems in Karamoja. FAO, Kampala.

———. 2015a. Livelihood Zones and Profile. FAO, Kampala.

———. 2015b. Karamoja Food Security Assessment. FAO, Kampala.

———. 2015c. Gender Analysis of Water for Production among Small-scale Agriculture Producers in Karamoja. FAO, Kampala.

———. 2016a. The Impact of Conflict on the Livestock Sector in South Sudan. FAO, Juba.

———. 2016b. Karamoja Food Security Seasonal Assessment. FAO, Kampala.

FAO/GIEWS (Food and Agriculture Organization Global Information and Early Warning System). 2014. Livestock and Market Assessment Mission to Karamoja Region, Uganda. FAO, Kampala. http://www.fao.org/3/a-i3674e.pdf (accessed May 2016).

FAO/GoU (Food and Agriculture Organization/Government of Uganda). 2014. Household Economy Baseline Assessment: Livelihood Profiles, Karamoja Region, Uganda. FAO, Kampala.

FEWSNET (Famine Early Warning Systems Network). 2010. Livelihood Mapping and Zoning Exercise: Uganda. http://www.fews.net/sites/default/files/documents/reports/UG_zonedescriptions_en.pdf (accessed May 2016).

IICD (International Institute for Cooperation and Development). 2010. Livestock Disease Surveillance in Karamoja: The Importance of Early Detection of Diseases and Epidemics for Livestock Dependent Communities. IICD, Kampala. http://www.fao.org/fileadmin/user_upload/drought/docs/C&DPublicationLivestockDiseaseSurveillance2.pdf (accessed May 2016).

IGAD (Intergovernmental Authority on Development). 2015. Resilience Context Analysis: Resilience to Food Insecurity and Malnutrition in Karamoja. IGAD, Djibouti. http://documents.wfp.org/stellent/groups/public/documents/ena/wfp276266.pdf?_ga=1.125409482.1171403768.1460369463 (accessed May 2016).

Isabirye, R. 2003. Alternatives in Animal Health Service Delivery: The Future for Pastoralist Areas. PACE Uganda Bulletin, July–September 2003. Pan-African Programme for the Control of Epizootics, Kampala.

Kratli, S., 2010. Karamoja with the Rest of "the Rest of Uganda." *Nomadic Peoples* 14 (2): 3–23.

LEGS. (Livestock Emergency Guidelines and Standards). 2014. *Livestock Emergency Guidelines and Standards, Second Edition.* Rugby: Practical Action Publishing. http://www.livestock-emergency.net/wp-content/uploads/2012/01/LEGS-2nd-edition-reprint-October-2015-reduced-locked.pdf (accessed May 2016).

Levine, S. 2010. What to Do about Karamoja? Why Pastoralism Is Not the Problem but the Solution. A Food Security Analysis of Karamoja. FAO/ECHO, Kampala. http://www.celep.info/wp-content/uploads/downloads/2011/07/what-to-do-about-Karamoja.pdf (accessed May 2016).

Leyland, T. 1997. Karamoja Trip Report May 13–19, 1997. Participatory Community-based Vaccination and Animal Health Project. Tufts University School of Veterinary Medicine and Organisation of African Unity/Interafrican Bureau for Animal Resources, Nairobi.

Leyland, T., R. Lotira, D. Abebe, G. Bekele, and A. Catley. 2014. Community-based Animal Health Care in the Horn of Africa: An Evaluation for the US Office for Foreign Disaster Assistance. Feinstein International Center, Tufts University Friedman School of Nutrition Science and Policy, Addis Ababa and Vetwork UK, Great Holland.
http://fic.tufts.edu/assets/TUFTS_1423_animal_health_workers_V3online.pdf (accessed May 2016).

Little, P. D., J. McPeak, C. B. Barrett, and P. Kristjanson. 2008. Challenging Orthodoxies: Understanding Poverty in Pastoral Areas of East Africa. *Development and Change* 39 (4): 587–611.

MAAIF/UBOS (Ministry of Agriculture, Animal Industry and Fisheries/Uganda Bureau of Statistics). 2008. The National Livestock Census Report 2008. Ministry of Agriculture, Animal Industry and Fisheries, Entebbe and Uganda Bureau of Statistics, Kampala.
http://www.agriculture.go.ug/userfiles/National%20Livestock%20Census%20Report%202009.pdf (accessed May 2016).

Mercy Corps. Forthcoming. Strategic Resilience Assessment for Karamoja. Mercy Corps, Kampala.

Mercy Corps. n.d. Karamoja Cattle Market Assessment Report. Sustainable Transformation in Agriculture and Nutrition (SUSTAIN) Project. Mercy Corps, Kampala.

Muhereza, F., and P. Otim. 2002. *Pastoral Resource Competition in Uganda: Case Studies into Commercial Livestock Ranching and Pastoral Institutions*. Utrecht: International Books and Addis Ababa: Organization for Social Research in Eastern and Southern Africa.

Mugerwa, S., A. Stephen, and A. Egeru. 2014. Status of Livestock Water Sources in Karamoja Sub-region, Uganda. *Journal of Resources and Environment* 4 (1): 58–66.

PLI Policy Project. 2010. Impact Assessment of the ACDI/VOCA Livestock Markets in Pastoralist Areas of Ethiopia. PLI Policy Project, Feinstein International Center, Tufts University Friedman School of Nutrition Science and Policy, Addis Ababa. http://pdf.usaid.gov/pdf_docs/pa00ktd3.pdf (accessed May 2016).

RLP (Resilience Learning Project). 2016. Karamoja Livestock Market Assessment Report. USAID/East Africa Resilience Learning Project, Nairobi. http://pdf.usaid.gov/pdf_docs/PA00M1W9.pdf (accessed May 2016).

Rutagwenda, T. 1997. Draft Report on Livestock Diseases in Kotido District, Karamoja. Epidemiology Unit, Department of Veterinary Services, Ministry of Agriculture, Animal Industry and Fisheries, Kampala.

Sandford, R. H. D. 1988. Proposals for Oxfam's Role in Livestock Development in Kotido District, Uganda. Oxfam GB, Kampala.

Stites, E., and D. Akabwai. 2009. Changing Roles, Shifting Risks: Livelihood Impacts of Disarmament in Karamoja, Uganda. Feinstein International Center, Tufts University Friedman School of Nutrition Science and Policy. http://fic.tufts.edu/publication-item/changing-roles-shifting-risks/ (accessed May 2016).

Stites, E., and Akabwai, D., 2012. Life in Town: Migration from Rural Karamoja to Moroto and Mbale. Feinstein International Center, Tufts University Friedman School of Nutrition Science and Policy. http://fic.tufts.edu/publication-item/life-in-town-migration-from-rural-karamoja-to-moroto-and-mbale/ (accessed May 2016).

Stites, E., J. Burns, and D. Akabwai. 2014. "It's Better to Sweat than to Die": Rural-to-Urban Migration, Northern Karamoja, Uganda. Feinstein International Center, Tufts University Friedman School of Nutrition Science and Policy. http://fic.tufts.edu/publication-item/its-better-to-sweat-than-to-die-rural-urban-migration-northern-karamoja-uganda/ (accessed May 2016).

UBOS (Uganda Bureau of Statistics). 2002. 2002 Uganda Population and Housing Census, Uganda Bureau of Statistics, Kampala. http://www.ubos.org/onlinefiles/uploads/ubos/pdf%20documents/2002%20Census%20Final%20Reportdoc.pdf (accessed May 2016).

Vétérinaires Sans Frontières Belgium (VSF-B). 2016. Assessment of the Functionality of Veterinary Supply Points in Karamoja. VSF Belgium, Kampala.

Washington-Allen, R. A., T. G. Van Niel, R. D. Ramseya, and N. E. West. 2004. Remote Sensing-based Piosphere Analysis. *GIS Science and Remote Sensing* 41 (2): 136–154.

WFP/FAO/GoU (World Food Programme, Food and Agriculture Organization, Government of Uganda), 2014. Karamoja Food Security Assessment. WFP, Kampala. http://documents.wfp.org/stellent/groups/public/documents/ena/wfp266332.pdf?iframe (accessed May 2016).

WFP/UNICEF/GoU, 2014 (World Food Programme, United Nations Children's Fund, Government of Uganda), Food Security and Nutrition Assessment (FSNA) in Karamoja. WFP, Kampala http://documents.wfp.org/stellent/groups/public/documents/ena/wfp274165.pdf?_ga=1.154703096.1171403768.1460369463

World Bank. 2014. Project Appraisal Document for a Regional Pastoral Livelihood Resilience Project. The World Bank, Washington DC. http://documents.worldbank.org/curated/en/672711468002404897/pdf/716340PAD0P129010Box382155B00OUO090.pdf (accessed June 2016).

Annex 1. Livestock disease investigations in Karamoja

Table A1. Local reporting of animal diseases in Dodoth, 1991 (Source: Gonda, 1991, cited by Catley, 1997)

Local name of disease	Scientific name of disease	Number of parishes reporting problem (total parishes = 17)
Cattle:		
loleeo	rinderpest	17
loukoi	CBPP	17
lokit	East Coast fever	17
lopid	anaplasmosis	17
lokicumet	blackquarter	13
lotidae	anthrax	12
ejota	FMD	5
lomany	liver fluke	8
emadang	tick infestation	4
abur	trypanosomiasis	6
not stated	arthritis/swollen joints	3
lookot	diarrhea	1
not stated	eye infection	3
Sheep:		
not stated	"slim" (?worms or fluke)	16
Goats:		
loukoi	contagious caprine pleuropneumonia	16
emitina	mange	2
not stated	peste des petits ruminants?	2
Dogs:		
longokwo/lokerep	rabies	10
Fowl:		
not stated	fowl pox	12
not stated	fowl cholera	10
not stated	Newcastle disease	11
not stated	mites and lice	8

Table A2. Cattle disease investigations in Kotido district, 1994 (Source: adapted from Rutagwenda, 1997)

Disease	Diagnostic test	Test positivity (%)	Interpretation
Brucellosis	Serum agglutination test	2.0 – 47.4	Results indicate exposure to *Brucella abortus*; test has low sensitivity and specificity. Results do not show disease prevalence.
Fascioliasis	Fecal examination	5.0 – 49.7	High level of infection with liver flukes, indicative of high levels of disease.
Strongylosis	Fecal examination	18.1 – 42.3	Widespread infection with gastrointestinal helminths; limited evidence of disease.
Theileriosis	Blood film examination	22.5 – 41.2	High levels of disease likely.
	Indirect fluorescent antibody test	0 – 41.9	Results indicate exposure to *Theileria sp.*, not disease.
Anaplasmosis	Blood film examination	0 – 26.1	Results indicate infection levels but not levels of disease.
Trypanosomiasis	Blood film examination	0 – 10.0	Disease prevalence of 10% or more likely; test has low sensitivity.

Table A3. Disease investigations in Moroto, Nakapiripirt, Kotido, Abim, and Kaabong districts, 2008–2010 (source: adapted from IICD, 2010)

Test	Test positivity			Interpretation
	Cattle (n = 3,935)	Goats (n = 729)	Sheep (n = 306)	
Brucellosis (Rose Bengal test)	9.7%	8.8%	2.6%	Livestock in Karamoja are exposed to brucellosis.
Anaplasmosis (thin blood smears)	23.2%	5.5%	4.9%	Some livestock in Karamoja are infected with anaplasma, although not necessarily suffering from disease.
Babesiosis (thin blood smears)	19.7%	2.3%	1%	Some livestock in Karamoja are infected with babesia, although not necessarily suffering from disease.

NB. The IICD report also includes positive test results for worm infection and East Coast fever. However, the report presents all positive tests results as measures of disease prevalence. This is a questionable interpretation of the test results, because a positive test result does not necessarily mean that an animal suffered from disease. Overall, the laboratory results indicate that certain diseases are likely to be present in Karamoja.