S P E C I A L R E P O R T

FAO/GIEWS LIVESTOCK AND MARKET ASSESSMENT MISSION TO KARAMOJA REGION, UGANDA

3 April 2014

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, ROME

I3674E/1/03.14

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Acronyms

APFS	Agro-Pastoralist Field Schools
CAHWA	Community Animal Health Workers Association
CAHW	Community-based Animal Health Worker
CBPP	Contagious Bovine Pleuro-Pneumonia
CCPP	Contagious Caprine Pleuro-Pneumonia
DAOs	District Agricultural Officers
DFID	Department of International Development
DM	Dry Matter
DoCAHWA	Dodoth Community Animal Health Workers Association
DPOs	District Production Officers
DVOs	District Veterinary Officers
FAO	Food and Agriculture Organization of the United Nations
FFS	Farmer Field Schools
GIEWS	Global Information and Early Warning System on Food and Agriculture
GIZ	German Society for International Cooperation
GoU	Government of Uganda
ha	hectares
ILCA	International Livestock Centre for Africa
JiCAHWA	Jie Community Animal Health Workers Association
KALIP	Karamoja Livelihoods Programme
kg	kilogrammes
km	kilometres
LDUs	Local Defence Units
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries
NAADS	National Agricultural Advisory Services
NDVI	Normalized Difference Vegetation Index
NGO	Non-Governmental Organization
OPM	Office of the Prime Minister
PET	Picture Evaluation Tool
RFE	Rainfall Estimates
TAMSAT	Tropical Applications of Meteorology using SATellite
TLU	Tropical Livestock Unit
TOT	Terms of trade
UBOS	Uganda Bureau of Statistics
UGX	Uganda Shilling
ULA	Uganda Land Alliance
UPDF	Uganda People’s Defence Force
VITO	Flemish Institute for Technological Research
VSF	Vétérinaires Sans Frontières
WFP	World Food Programme

Mission Highlights

- Following improved security conditions, pastoralists have returned to the pre-protected kraal system seasonal grazing patterns, being free to carry-out traditional management practices inherent to the right to roam, with consequent better access to pasture and water.
- Despite a two-dekad dry spell in May-June, rainfall performance has been generally good along the season, with positive effects on grazing resources availability as confirmed by satellite-based data showing above long-term average vegetation growth across the region.
- Livestock body condition is generally good, with low scores only in some areas in the north with reduced pasture/water availability or with the presence of tse-tse flies. As expected, milking cows show the lowest body conditions, if compared to other classes of cattle.
- Outbreaks of trypanosomosis have increased in 2013 and are likely spreading southward from the Kidepo Valley National Park, allegedly with increased movements of buffalo that carries the tse-tse flies. Other endemic diseases have often been contained by effective controlling measures.
- In most markets, livestock prices showed a rising trend during the last three years and terms of trade for pastoralists have generally improved. Increasing sales of healthy animals in good body condition were noted in most markets as part of the normal livelihood strategy of local households.
- There is significant demand for local animals by Ugandan traders from other districts as well as from South Sudan and Kenya. Local herders are interested in purchasing heifers, often imported from outside the region, suggesting that local herds are recovering after their decimation during the protected kraal years.

1. OVERVIEW

An FAO/GIEWS Livestock and Market Assessment Mission visited Uganda from 2 to 17 February 2014 to assess the overall livestock situation in the Karamoja Region. The Mission was in connection with a household food security assessment being conducted simultaneously and jointly by FAO, WFP, the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) and NGO assessing teams. In Kampala, the Mission Team held meetings with officials of MAAIF, the Office of the Prime Minister (OPM), DFID, the World Bank as well as with resident staff of FAO and WFP.

Over a ten-day period, the Mission Team visited all seven districts in Karamoja, including the livestock markets of Amudat and Kotido (Kanawat). Travelling for about 1 500 kilometres, observations of the status and availability of grazing resources (transects) were done using the Pictorial Evaluation Tool (PET) developed for Sudan and Somalia. About 3 000 observations of pasture conditions were translated into daily average estimates of dry matter availability. At the same time, herds and flocks were scored for body condition by classes (bulls, steers, heifers, milking cows, dry cows, goats, sheep, etc.) using the same PET approach. A total of about 760 head of cattle have been scored at 20 location clusters along the route and the weighted means of each livestock class provided an accurate view of livestock body condition at the end of the 2013/14 dry season.

Location-specific information was also obtained from key informant interviews regarding the performance of livestock. Key informants included District Veterinary Officers (DVOs), District Agricultural Officers (DAOs), District Production Officers (DPOs), Local Government Officials (LC 5s), and livestock market officials. From the side of NGOs and International Agencies, key informants included staff from GIZ (Germany), Oxfam (GB), RiamRiam, Uganda Land Alliance (ULA), Vétérinaires Sans Frontières (VSF) (Belgium), Caritas, the Karamojong Pastoralist Association, Irish Aid and Community Animal Health Worker Associations, such as JiCAHWA (for Jie pastoralists) and DoCAHWA (for Dodoth pastoralists).

Secondary information was obtained from a review of recent reports on Karamoja's natural resources produced by FAO, OPM, MAAIF, NGOs as well as UBOS statistics (2002; 2008) particularly connected to livestock and agro-pastoralism. Rainfall estimates (RFE by TAMSAT) and Normalized Difference Vegetation Index (NDVI) data, including absolute values and anomalies, were provided by the Flemish Institute for Technological Research (VITO) for all seven districts. These data were compared with key informant and cases study accounts of rainfall from January 2013 to December 2013. Regarding market

analysis, in addition to WFP's market price data, the Mission Team directly observed livestock market presentations and spot prices from visited markets.

The Mission's findings show that improved security following the successful Disarmament Policy has allowed the near complete dismantling of the protected kraals, with only few still currently in place. The new environment has opened the opportunity for pastoralist units to return to the original seasonal grazing patterns, under the protection of Local Defence Units recruited from the same communities. At the same time, herds/flocks in each vicinity are now free to carry out traditional management practices inherent in the right to roam, including accessing better pasture (without exhausting to destruction swards close to the kraals), accessing nutritional mineral resources, applying differential watering patterns, pollarding bushes and browse trees, and exercising controlled burning.

According to Mission's observations during transects, daily calculations of residual biomass ranged from 0.35 to 3.00 tonne/ha. The greatest residual grass availability was noticed in areas with the least livestock presence, such as the tse-tse-infested areas bordering the Kidepo Valley National Park in Kaabong District. Conversely, the areas with the least residual grass availability were noted in the ranges of Rupa approaching the Kobebe Dam in Moroto District, where stocking density was noted to be high due to the presence of large numbers of Turkana herds and flocks. Similarly, low levels of grass biomass were recorded in Panyangara in Kotido District from where the Jie herds had already left for western dry season grazing zones. In all visited agricultural and agro-pastoralist areas, last year's stover was still standing in the fields, practically untouched, ready for consumption by homestead-based components of the herds or flocks. Mission's estimates of high residual pasture availability confirm the remote-sensed NDVIs readings showing greater levels of browse and perennial grazing than the long-term averages in all districts.

Current livestock population estimates provided by DVOs point to about 1.8 million heads compared to about 6 million in 2008 UBOS Livestock Census, showing a reduction of about 70 percent.[1] The new data connect to an annual stocking rate of 0.5 Tropical Livestock Unit (TLU) per hectare of grazing area, similar to estimates for dry-land areas in neighbouring countries and in a much more likely order of magnitude if compared to the stocking rate based on 2008 UBOS data averaging high 1.92 TLUs per ha.

Although at the end of the dry season, livestock body condition in February were generally good due to sufficient availability of pasture/water and good health (no widespread outbreaks of any acute endemic disease). Body conditions were scored for all classes (bulls, heifers, calves, dry cows and milking cows) during walking transects in the ranges, water points, kraals and markets. As expected, lower scores were noted in areas with reduced pasture/water availability. Milking cows reported always lower body conditions if compared to other classes, essentially due to a management system that expects milking cows to mobilise body tissue to meet the increased nutritional demand of lactation. Body conditions for all herds and flocks showed a gradual decrease from south to north, most likely due to the effect of trypanosomosis, which spreads southwards from wildlife reserves through migrating buffalo. Outbreaks of other endemic livestock disease (mainly CBPP, CCPP and tick-borne diseases) have been often contained by effective controlling measures, such as ring-vaccinations.

Livestock prices have been increasing in most markets of the region during the last three years and were generally stable in February. Terms of trade for pastoralists have generally improved since January 2011, with the exception of Kaabong where sorghum prices have systematically increased more than livestock prices. In the visited markets of Amudat and Kotido, the Mission Team noted that presentations for sale were low in numbers as most herds/flocks seasonally moved to remote grazing areas, far from urban trading centres. However, presented animals were generally in good body conditions and healthy, challenging the common understanding that the Karamojong people tend to sell only old and sick animals at the end of their productive career. Significant demand for local animals was noted from traders from Ugandan districts outside Karamoja as well as from South Sudan and Kenya. The Mission Team also noted that local herders are interested in purchasing heifers, often imported from outside the region in order to genetically improve the local breeds, and it means an increase in numbers of young breeding females in herds/flocks, suggesting that the local livestock sector shows clear signs of recovery after the decimation of the protected kraal years.

[1] DVOs' data differ from livestock population estimates of one million cattle plus 2 million sheep and goats used as target for the 2013/14 vaccination program by the MAAIF.

2. BACKGROUND INFORMATION

Karamoja Region, in north-eastern Uganda is now administratively divided into seven districts: Kaabong, Abim, Kotido, Moroto, Amudat, Napak and Nakapiripirit. The Region borders Kenya to the east, South Sudan to the north and the districts of Kitgum, Pader, Lira/Agago, Amuria and Karakwi to the west; and Kumi, Sironko and Kapchorwa to the south as noted in Figure 1. The Region is part of the Karamoja Cluster, consisting of predominantly agro-pastoralist groups that share common languages, culture, history and livelihood systems across northeastern Uganda, northwestern Kenya, southeastern South Sudan and southwestern Ethiopia. Overall population in Karamoja is estimated at about 1.2 million people, with about 70 percent residing in rural areas.

Land in Karamoja is owned and managed by individuals within the community under customary land tenure systems. As such, the majority of individuals within a given household acquire land by inheriting it from their parents, or receiving it as a gift from a friend or a relative. Sale of such land is also possible. Other forms of land acquisition include renting or use of public land such as opportunistic/speculative plots in gazetted areas such as game or forest reserves. Average land ownership per household ranges from 2-5 acres (1-2 ha), usually located at distances ranging from a few meters up to 2 km from the village or fenced hamlet (called *manyatta*), depending on the security situation. Actual area cultivated depends on availability of quantity and time of onset of the rains household labour, and access to secure farmland.

The long-term average rainfall pattern provides a climate suitable for both cropping and pasture development. However, cyclical weather patterns of rainfall failure are noted to occur every two years[2], with severe drought episodes every five years. Nevertheless, in the more humid, western zones, two crops are regularly planted in series over the longer growing season.

2.1 Agricultural systems

Crop production in Karamoja is rain-fed. Its importance to household food economies increases from east to west conforming to the pattern and reliability of rainfall as shown in Figure 1. No field-crop scale irrigation is undertaken in Karamoja although irrigated horticultural crops are found in western areas where traditional vegetable growing areas using springs and wetlands, close to ready markets are noted. Limited vegetable growing is also found near trading centres. Some pilot plots have been undertaken by NGOs to supply fruit trees to communities but these have yet to be developed beyond demonstration areas into commercial enterprises.

Survey data indicate that rain-fed sorghum and maize are dominant crops accounting for 96 and 130 percent[3] of the land being cultivated by Karamoja households. These estimates should be compared with households reportedly growing beans (<10 percent), groundnuts (<8 percent), cassava (>2 percent, recently much increased) and sweet potatoes (>4 percent also recently increased). The low levels of these alternative crops have been attributed to priority given to secure food crops and crops known to grow in the home plot and a previous lack of planting material for the alternatives. The latter problem is being addressed through free seed provisions connected to FAO supported Farmer Field Schools (FFS) and Agro-Pastoralist Field Schools (APFS) and other interventions by NGOs connected to farmer and women's groups.

Overall, Karamoja has a unimodal seasonal production calendar governed by the rainy season that extends from February to October, depending on the zone, with short dry spells around June. The cropping pattern is defined by the onset of rains, when planting of the most important food security crops (early sorghum, long-term sorghum, maize, finger millet and cowpeas) begins. First planting usually starts in February/March with a second planting of earlier maturing crops (bulrush millet, beans, sweet potatoes and some groundnuts) in August/September. Cassava, following widespread promotion by OPM, is increasingly being planted in the western and central districts both as a one-year cash crop and as an all-year-round planted and harvested subsistence crop.

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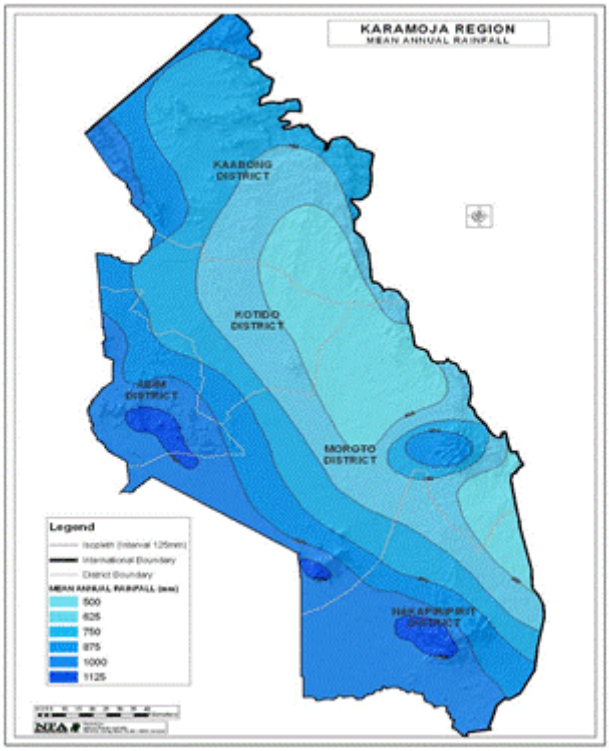
[2] Mubiru D.N. (2010), Climate change and adaptation options in Karamoja, European Unions and Food and Agriculture Organization.

[3] The percentage is above 100 percent as some fields are intercropped therefore some fields have 200 percent occupancy increasing land use over 100 percent.

Figure 1: Karamoja's Isohyets



More specifically, the wetter, western agro-ecological zone (called "Greenbelt") with 800 to 1 125 mm of rainfall per annum has a growing season that extends from March to October. This area comprises predominantly loamy soils with alluvial deposits adjacent to hills and mountains and some stretches of vertisols in the plains. The zone supports a much wider variety of crops than in the drier areas to the east and permit second and third plantings of quick-maturing cash and food crops after the main harvest of maize and beans *viz-à-viz* sesame, sunflowers, cassava, yams, sweet potatoes, sugar cane, assorted local vegetables, fruits (mangoes, oranges, sweet bananas, passion fruit, paw paw) and cotton. Some northern areas of the Greenbelt next to the Kidepo Valley National Park and other wildlife reserves and forests further south are infested by tse-tse flies. The tse-tse fly is the vector of trypanosomosis, a wasting disease of animals and the cause of sleeping sickness in humans. Consequently, the zone has had traditionally a lower presence of livestock. Cultivation is predominantly by hand unless tractors are available, at which point cultivated areas are increased and commodities are produced for sale.

The agro-pastoral zone, also referred to as the sorghum-livestock zone, receives on average, an annual rainfall of 500 mm to 800 mm. This rain is often erratically distributed and, when combined with relatively high surface temperatures, provides less favourable cropping conditions without irrigation. Mixed farming is possible on the sandy-loam soils but crop performance is low compared to the western green belt. The system is characterised by small, rainfed plots around the *manyatta* and settlements where intercropping is practised, an important strategy to increase diversity in the overall household food basket, spread risk of crop failure and optimising production from the small plots of land. The main crops grown are sorghum, finger millet, bulrush millet, maize, beans, cowpeas, groundnuts, sunflower, cucumber, pumpkins and tobacco. The livestock component of the agro-pastoralist farming system connects to the transhumant herds, which provide regular contributions to the household food economy through the sale of bulls, steers, cull cows; and sheep and goat slaughter stock through the weekly markets. In this zone, an estimated 80 percent of the farmers use oxen for animal traction.

The eastern arid pastoral zone is a limited area comprising East Kotido and Amudat. These two locations receive relatively low and poorly distributed rainfall that varies from 500 down to less than 300 mm per annum. The very high surface temperatures and erratic rainfall coupled with extended dry conditions and permeable soils of low fertility (predominantly sand, sandy loams and sandy-clay) make this zone less suitable for diverse crop production in most years. Crops are limited to sorghum and

bulrush millet, grown where run-off collects; and optimistically planted in much wider areas when the rains are favourable. Sale of animals from the largely transhumant herds form the solid basis of the household food economy.

Inputs in farming systems in Karamoja are essentially labour and seed. Fertilisers are not available and have no history of use in the region. In spite of the traditional abundance of livestock, use of animal manure is not common, except for kraal planting of tobacco (the only crop traditionally watered). Findings from a rapid food security assessment conducted by FAO in October 2008 indicated that 34 percent of farming households used home-saved, carryover seed; 31 percent used locally purchased seed and 25 percent used seed borrowed from fellow farmers. Only 10 percent obtained improved seed from either government (NAADS) or NGOs. This suggests that, while improved seeds are considered by specialists as being highly desirable, local land-races with specific qualities such as long-maturing sorghums, tolerant to dry spells and water logging and producing plenty of stover; and, early maturing finger and pearl millets for early and late planting respectively, are preferred by those whose survival depends on the crops they grow.

2.2 Livestock population in Karamoja

Recognising the need for a better understanding of livestock numbers in order to estimate national assets and inform policy directions, the Government of Uganda (GoU) through the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) and the Uganda Bureau of Statistics (UBOS), conducted National Livestock Census in 2008. The results show that 2008 livestock population in Karamoja was estimated at about 6 million head, representing about 19.8 percent of the national cattle (2.3 million head); 16.3 percent of the goats (2.0 million head) and 49.4 percent of the sheep (1.7 million head).

Table 1 shows distribution of livestock population by district. If compared to 2002 UBOS figures, cattle numbers have increased by 35 percent, sheep and goats by 76 percent and Tropical Livestock Units[4] (TLUs) by 45 percent. Most analysts of East African pastoralist livestock data suggest that 3-8 percent per annum is the range for cattle herd growth rates, while 18-36 percent per annum are flock growth rates for sheep and goats. The estimated numbers in Table 1 fall into such ranges, which is surprising considering the series of droughts and disturbances suffered between 2002 and 2008 in Karamoja.

Table 1: Livestock population (UBOS 2008)

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

1/ Data for Napak District are included in Moroto District as Napak District was created after 2008.
2/ Data for Amudat District are included in Nakapiripirit District as Amudat District was created after 2008.

By juxtaposing numbers of livestock with areas of arable/rangeland, Table 2 gives an indication of the TLU stocking rates prevailing according to the 2008 UBOS figures. At an overall average of 1.92 TLUs per hectare of grazing area, the stocking rates estimates are extremely high to the point of improbability by East African standards and, as there are no imported livestock feeds in the system, the rate may only be partially explained by a) the fact that significant numbers of animals from Kotido (Jie herds and flocks) and, Nakapiripirit (Amudat included- Pokot herds) traditional leave their districts and the Region, b) the absence in the calculation of the grazing area for Abim, a district with less than settled 20 000 TLUs; and c) that herders do graze in the wild life reserves. The recorded deaths and the

[4] The TLU is a theoretical construct aggregating livestock species for calculation purposes, with cattle = 0.8 TLU and sheep and goats = 0.2 TLU.

extremely poor quality of all livestock noted in 2009 by the KALIP preparation team and strongly reported by several stakeholders may be explained by impossibly high stocking rates exacerbated by restricted access – the two factors combining with devastatingly negative effects.

Table 2: Estimated stocking rates by district in hectares of grazing area per TLUs

District	Total area (000s ha)	Parks & wildlife reserves (000s ha)	Estimated grazing area[1/] (000s ha)	TLUs 2008 (000s)	TLU/total area 2008	TLU/grazing area 2008
Kaabong	727	358	367	596	0.82	1.63
Kotido	596	230	362	788	1.32	2.17
Abim	n/a	n/a	n/a	n/a	n/a	n/a
Moroto	844	490	350	417	0.49	1.19
Nakapiripirit	582	250	238	726	1.25	3.05
Karamoja	**2 749**	**1 328**	**1 317**	**2 529**	**0.92**	**1.92**

Source: UBOS 2008.
1/ In the cases of Moroto, Kotido and Nakapiripirit Districts, the areas noted are classified as agricultural areas and declared open for cultivation; no designated pastureland appears in the breakdowns of land use.

2.3 Livestock systems

Most livelihoods systems in Karamoja obtain a proportion of their annual income from livestock comprising cattle, goats and sheep, village-based scavenging pigs and backyard poultry, depending upon wealth, household size and structure.

The transhumant agro-pastoralist production system revolves around two sub-systems: i) the seasonal movement of herds or flocks in cattle camps or kraals between two or more seasonal pasture areas and ii) crop production in fields with an easy reach from the village (*manyatta*) that is the permanent settlement, serving the mobile units and supporting changeable sections of the herds and flocks that do not move to provide the *manyatta* with services such as traction and milk or are unable to follow the mobile units due to age. The pastoralist system, the smallest system in terms of people involved, is similar to the agro-pastoralist system but has no village-based agriculture. Herds and flocks are bigger and move in larger aggregations, distances travelled are greater and may involve more locations; but the movements are still transhumant rather than nomadic. Finally, a minor, settled livestock system in the western zone involves utilisation of local rough grazing (bush-fallow), cereal by-products and brewers' grains for 1-2 house cows, draught oxen (up to 4) and assorted sheep or goats (5-10) for each household. These animals graze within the vicinity of the village and are tethered during the growing season.

Ninety-seven percent of the domestic livestock population is found in the agro-pastoralist/pastoralist systems. The pastoralist component in each case is a transhumant livestock rearing system based on the prescribed movement of the majority of the herds and flocks, throughout the year, in search of water and grass. A small part of the herd is held at the home-base either for immediate use or as a way to spread risk. The rest of the animals are moved in kraals as either single family herds/flocks or combinations of related herds/flocks, moving as groups. Traditionally, kraals and villages are linked and exchanges between the two are common. For instance, food is exchanged, with the kraals providing livestock products such as ghee, meat, skins, milk, and slaughter/cull stock for consumption in the *manyatta*, use in ceremonies and for sale. In return, kraal-based members obtain cereals, pulses, local beer supplementing similar products that they may sometimes buy using cash from direct sales of livestock through the many markets.

Pasture management varies from north to south of Karamoja according to the climatic and edaphic conditions and cordiality of the relationships between tribes, which may loosely be called security. Traditionally, pastoralists move their animals within the framework of drinking water availability and where they know they are able to defend themselves and their assets. Prior to disarmament, which began in 2006 and has continued until this year, pasture management was a secondary consideration with security always the primary concern. Consequently, the indigenous tropical grasses produce at a level far lower than their genetic potential exhibited by the same grasses on well managed farms under similar rainfall and edaphic conditions but with fertiliser use (3-7 tonne/ha of dry matter instead of a possible 30 to 40 tonne/ha). Browse provides high protein dietary contributions throughout the year and,

during the dry season, leaves and pods, eaten with the dry grass, raises the digestibility of the diet. The production from browse trees varies from species to species, with age of tree and tree density per unit area.

Most common pasture management practices by Karamojong people include: i) movements from kraal to kraal as areas become grazed to a point when further use becomes destructive; ii) daily travel of up to 12-14 km per day from the kraal to grazing areas for the more able/older or more conscientious herder, with earlier morning departures and later evening returns than the less able/often very young or less conscientious herder; iii) combination stocking (mixtures of numbers of cattle, sheep and goats) adjusted to match browse and grass type availability at the preferred sites; iv) changing watering regimes adjusted to account for water availability and the water content of grasses eaten at different times of the year; and the physiological state and associated requirements of the animals in the herd/flock; v) controlled and timely burning of pasture (only if it is expected that the burner will profit from the highly digestible re-growth); vi) shaking high protein pods and leaves/lopping branches/pollarding browse trees for feeding in situ or dragging back to the kraal and vi) regular visits to mineral rich areas included in the round. Transhumant pattern of movements by main Karamojong ethnic groups are summarised in Figure 2.

Figure 2: Karamojong seasonal livestock calendar (major migratory patterns)

<table>
<tr><td></td><td colspan="12">Months</td></tr>
<tr><td></td><td>Jan.</td><td>Feb.</td><td>Mar.</td><td>Apr.</td><td>May</td><td>Jun.</td><td>Jul.</td><td>Aug.</td><td>Sept.</td><td>Oct.</td><td>Nov.</td><td>Dec.</td></tr>
<tr><td>Seasons</td><td colspan="3">Dry</td><td colspan="2">Wet</td><td>Dry</td><td colspan="3">Wet</td><td colspan="3">Dry</td></tr>
<tr><td>Pastures</td><td colspan="3">Scarce</td><td colspan="4">Surplus</td><td colspan="3">Available</td><td>Scarce</td></tr>
<tr><td>Water</td><td colspan="3">Scarce</td><td>Limited</td><td colspan="5">Plenty</td><td colspan="2">Limited</td><td>Scarce</td></tr>
<tr><td>Ethnic groups</td><td colspan="12"></td></tr>
<tr><td>Dodoth</td><td colspan="2" rowspan="5">settled in dry season grazing areas</td><td rowspan="5">start to return to wet season areas</td><td colspan="4" rowspan="5">grazing restricted around settlements</td><td colspan="3" rowspan="5">community dialogues, scouts sent</td><td rowspan="5">migration initiated</td><td rowspan="5">migration completed</td></tr>
<tr><td>Jie</td></tr>
<tr><td>Bokora</td></tr>
<tr><td>Matheniko</td></tr>
<tr><td>Pian</td></tr>
<tr><td>Pokot</td><td colspan="2">settled in dry season grazing areas</td><td>return to wet grazing areas</td><td colspan="6">grazing within wet grazing areas</td><td>migration initiated</td><td>settled in dry season grazing areas</td></tr>
</table>

Source: FAO (2009), KALIP Preparation Mission Working Papers.

More specifically, mobile unit movements by district are traditionally as follows:

In Kaabong District, there are enough permanent water sources and soil types that allow the Dodoth pastoralists to remain within the district, moving no more than 20 km from base during the year. However, the border of their western and southern movements takes them into juxtaposition/competition with the Jie pastoralists from Kotido. Their eastern border ranges are shared with the Turkana from Kenya.

In Kotido District, Jie pastoralists are required to be more mobile than the Dodoth. During the dry season their migrations often takes them selectively depending on the clan kraals, to Kacheri within Kotido itself then continuing as far as Abim district and into the neighbouring districts of Agago, Otuke, Pader and Kitgum. In the wet season they return to their settlement areas in the central and eastern uplands of Panyangara, Kotido, Nakapelimoru and Rengen sub-counties of Kotido District.

In Moroto and Napak Districts, the Karamojong people predominate and are divided into two main ethnic groups, the Matheniko and Bokora. Traditionally, both groups use the eastern drier belt of Moroto District and eastern Napak District respectively for wet-season grazing. In the dry season, the Matheniko's herds graze the wetter piedmont areas (Kobebe and Nakonyen) of Mount Moroto, while in Napak the Bokora's herds graze the western piedmont ranges of Mount Napak. Mobile units of each tribe follow traditional movements within and (through negotiations) between the two districts with sub-groups of each moving both north and south into ranges also occupied by the Jie (north) and the

Pian (south). A third tribe in Moroto is the Tepeth of Mount Moroto who occupies Katikekile and Tapac Sub-Counties. During the wet season and depending on relations with the lower Matheniko, they bring their herds into the lower plains of Mount Moroto. During the dry season the Tepeth move their herds to Tapac and other southern valleys close to Mount Moroto.

In Nakapiripirit District, the Pian is the main tribal group located in settlements around Lorengedwat, Nabilatuk and Lolachat Sub-Counties. During the wet season, the livestock are kept near the settlements while, in the dry season, they in a western and southerly direction into Namalu Sub-County.

In Amudat District, the Pokot, who are the most mobile of all the tribal groups migrating in and out of Kenya, are to be found during the wet season around the eastern drier belts of the district. During the dry season they move either west, near the Pian and the Matheniko grazing areas, or to east of Mount Kadam into Moruita Sub-County or south of Mount Kadam into Karita Sub-County.

In Abim District, the limited numbers of livestock are sedentary with their grazing areas more often used by mobile units of the Jie and the Bokara.

For generations, the most powerful tribes in Karamoja have exerted control over water points and grazing zones following traditional rights and mores, backed up by force. However, between the years 2006 to 2013[5], all movements were restricted under a strategy of establishing *protected kraals,* guarded and managed by the military, within the general policy to disarm the tribes and install security. Often, the military detachments, assigned to protect the disarmed pastoralists, were inadequately resourced to protect the herds and flocks throughout their assigned grazing lands. Also the need for good, varied grasslands coupled with adequate water supplies was not fully appreciated by the military commanders. Consequently, the herds were inevitably severely restricted, resulting in extreme overgrazing of immediately accessible grazing reserves, whilst adjacent good pastures remained inaccessible due to time and other constraints.

Owing to extreme pressure from all stakeholders concerned about losses due to the effects of a) restricted access to pasture and water causing severe malnutrition, b) confinement of thousands of head in limited areas with concomitant outbreaks of disease, c) reduced access of owners to their own stock at crucial times in the production cycle, exacerbated by d) repeat branding by soldiers, and e) theft of stock, the *protected kraal* strategy was relaxed from 2010 until by the time of the Mission in 2014, only two protected kraals are noted to remain out of the original thirty-five. Notwithstanding the significant effect on household assets caused by these losses, the combined effect of disarmament and considerable reduction in livestock numbers during the period of restricted grazing has brought about a much improved level of security. Taking the two dominant tribes in the north as an example, disputes over pastures and water in the past three years (2010-2013) between the Jie and Dodoth appear to have been substantially reduced following disarmament. In fact, the Mission Team noted that some very productive farming areas, often-contested between the two tribes and previously occupied through the use of force, have been settled by some households from Kaabong, showing a good improvement in local security conditions. Most importantly, the right to roam following the traditional transhumant cycles has been re-instated.

3. FACTORS AFFECTING LIVESTOCK SECTOR IN 2013/14

The five critical factors affecting performance are a) the quantity and distribution of rainfall and its effect on pasture and browse; b) water availability; c) availability and access to pasture; d) livestock disease; and e) the current stocking rates. Equally important at herd or flock level are the acumen and age of the herders, which in turn connect to the demography of the stock-owning households.

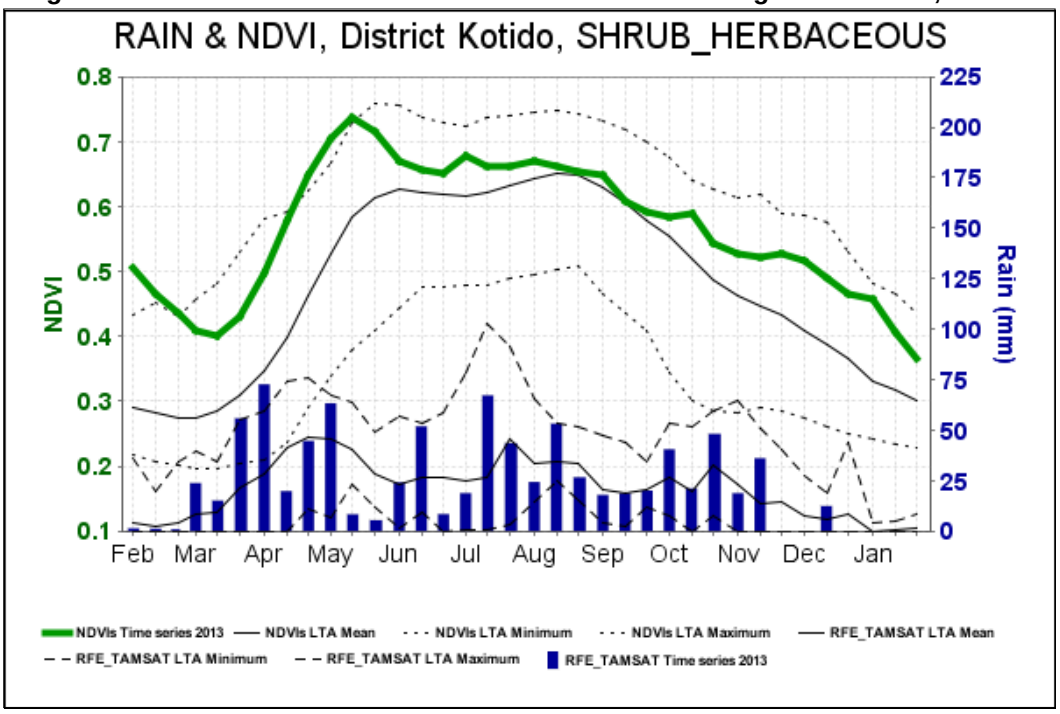
3.1 Rainfall patterns

In all districts, 2013 rainfall started on-time by mid-March and were abundant until mid-May when a greater than seasonally expected two-dekad dry spell (less pronounced only in Moroto District) occurred. Then, rains resumed in July and continued at average to above average levels until end November. According to the satellite-based vegetation indexes (NDVIs), vegetation growth in 2013 for

[5] The protected kraals system began to be broken up in 2010 as a result of stakeholder pressure. It was noted that only 2 protected kraals remained at the time of the Mission (February 2014), compared to 35 in 2009.

both agriculture and pasture has been far better than average. Rainfall estimates and NDVI profiles for all districts are and they show, as in Figure 3 for Kotido District as an example, that the vegetation cover reached high record levels at the beginning of the season in May-early June and, despite some decline in end June-July, remained for the whole season above the long term average trend.

Figure 3: Rainfall estimates and Normalized Difference Vegetation Index, Kotido



3.2 Water availability

Whereas forage and browse can benefit equally from surface water and ground water, livestock and their herders can only access surface water unless provide with mechanical assistance. In this regard, the Mission Team noted consolidated actions by the OPM and NGOs funded by a variety of donors throughout the Region, reinforcing water harvesting through the construction of dams, valley tanks, ponds; sand dams, and the establishment of hand-pump bore-holes. The man-made structures supplement the traditional use of natural water sources *viz-à-viz* flowing rivers, streams, springs and ponds as well as the traditional use of ground water in the shallow wells in dry river beds, all of which have been well-charged with consecutive years of good rains.

Key informant interviewees and case-studies confirmed that, at the time of the Mission, water availability was better than average and with: a) the continued freedom to roam that has been granted by removal of protected kraal restrictions; and b) the rains beginning early than usual in many areas, water should remain available in sufficient quantity for most herds until the rains begin properly, in March. It must be noted, however, that:

- The water level in the Kobebe Dam in Moroto District was surprisingly low compared to the Arechek Dam in neighbouring Napak District of a similar construction and size. The dam is noted to be providing water to large Turkana herds as well as the transhumant Pian (Nakapiripirit), Metheniko (Moroto) and (possibly) Jie mobile units from Kotido, which may be the reason for the lower water level. Notwithstanding, the lower capacity of Kobebe, which has similar design with Arechek, was noticed immediately on completion of the water retention structure. It is apparently a site location problem in relation to the north-western catchment zone of Mt. Moroto and the rivers emanating from Dodoth hills which are supposed to be the major feeding source.
- Dodoth herders interviewed in Kamion in northern Kaabong District, where fresh regrowth was available, but where Turkana herds were already evident in numbers, had also cut their watering regimes to every other day.
- In both places, Kobebe and Kamion, the rains had already started at the time of the Mission.

3.3 Residual grazing availability and prevailing grazing patterns

Mission's observations confirm that much more movements are apparent this year, within all the districts, than under the strict *protected kraal* management regimes. Protection of the livestock of the now-disarmed tribes is being provided by strengthened Local Defence Units (LDUs), based in the villages and commanded by UPDF officers. The new system is noted to provide a far more user-friendly level of protection to the herds and flocks as it is given by members of the tribal groups recruited into the LDUs in their own tribal areas.

The consequence of the change in strategy is a) reinforced security throughout Karamoja that allows essential movements conforming to traditional, diurnal grazing and watering patterns, b) affords full-time herder access to their own animals; and c) reduces the risk of infectious diseases inherent in kraaling tens of thousands of cattle, sheep and goat from all the villages, in close proximity in single pens, every night from 5 pm to 9 am. Consequently, the Mission Team noted a very different residual grazing profile from the one noted about four years ago, when overgrazing to the elimination of many useful species was readily apparent close to the kraals, while 15 km or so away from each protected kraal, thousands of hectares of standing hay were being left untouched.

The Mission's performed its transects of grass along the itinerary shown in Annex 1. Observations were taken continuously from the vehicle and clustered into approximately 20-minute means. The 20-minute cluster means were aggregated to provide an average mean observation in tonnes per hectare for each day. Table 3 summarises the means for each day's drive, with observations on grassland management and re-growth and stover condition.

Main results show that:

- At the time of the Mission, residual grasses are estimated to be present, adjacent to the roads and tracks travelled by the team, in most of the locations. Such sites are usually the places most heavily grazed.
- The level of daily mean residual dry grass varies from 0.38 to 3.00 tonne/ha. These daily means mask an extreme variability among the 20-minute clusters of the 3 000 spot observations taken that range from 0 to 5.00 tonne/ha.
- The residual grasses at the end of the dry season are all in advanced stages of senescence and are, therefore, of low quality.
- Given now the right to roam, the main herds and flocks have left the areas surrounding the locations close to the villages/*manyatta* in the agro-pastoralist zone, leaving behind enough residual grass to support, along with stover from the farms, the elements of the herd/flock that stay at home to provide milk or that are too young, weak or old to travel long distances.
- Pastures close to the trading centres have been well-grazed with no or very little residual biomass. The stover in such places was still intact, but grazing by the household stock had just started.
- Comprehensive burning was frequently noted in most 20-minute clusters. In such places, where it had already rained, re-growth was apparent. The tradition of burning is done with the main objective to obtain fresh and nutritious grass, (locally known as "*anomat*" in Karamojong language or "*amielü*" in Jie language) at the onset of the first rains, and to a minor extent, decimate ticks and their younger lifecycle stages.
- The combination of bulk (residual grasses) and the high protein but low biomass of post-burning re-growth, plus fodder tree leaves and any remaining pods, enhances the digestibility of the poor quality roughage, improving the diet of the pregnant stock; improving the body condition of the ex-milking stock; and, this year, sustaining the good body condition of the bulls, steers and heifers.

Table 3: Residual grazing transect summary

Day	Location	Residual grass (mean, DM) tonne/ha	Stover conditions	Grass management	Pasture re-growth
Day 1	Moroto to Lorengedwat	0.76	Some un-grazed plots	None	None
Day 2	Moroto to Rupa (Kobebe Dam location)	0.38	Some un-grazed plots	None, high stocking density	None, grazing heavy by Turkana
Day 3	Moroto to Nabilatuk turn	0.64	Not planted	None	None
	Nabilatuk, Nakapiripirit	0.8	Not planted	Intermittent burning	Yes; sward (old and new)
Day 4	Nakapiripirit to Amudat	0.52	Not planted	Only in Moruita	Yes, in Moruita
Day 5	Nakapiripirit to Napak border	1.30	Not planted	Intermittent burning	Yes; sward (old and new)
Day 5	Napak to Matany (incl. dam)	0.86	Significant areas un-grazed	Intermittent burning	Yes; sward (old and new)
Day 5	Matany to Abim border	1.46	Significant areas un-grazed, not in wildlife areas	Intermittent burning	Yes; sward (old and new)
Day 5	Within Abim to trading centre	Bush fallow not estimated	Significant areas un-grazed	Clearing for planting	Animals tethered
Day 6	Abim sub-county border to Kotido	0.86 (very patchy)	Very significant un-grazed stover in Kotido	Organised burning for new planting	Substantial re-growth sward (old and new)
Day 7	Kotido to Panyangara	0.37	Significant un-grazed stover, grazing started	Grasses grazed off as animals left	No re-growth, big herds already moved
Day 8	Kotido to Kaabong	1.00 (low 0.26 in peri-urban areas and high 1.40 in forest)	Very significant un-grazed stover from Kotido trading centre to north	Limited burning	No regrowth yet
Day 8	Kaabong to Kalapata	1.17 (but up to 1.77 in mountains)	Significant un-grazed stover from Kaabong trading centre to Kamion	Limited burning	Significant regrowth, grazed. High numbers of Turkana
Day 9	Kaabong to Kapedo via Lolelia	2.30	Very significant un-grazed stover	No burning	Mostly aging star grass; now greening
Day 9	Kapedo to Karenga	1.54	No planting until Karenga Sub-county	Intermittent burning	Yes, in mixed swards – old and regrowth
Day 9	Karenga to Lobalangit ranges, towards Kacheri	3.00	Very significant un-grazed stover	Intermittent clearing for planting, new settlements	Old grasses, new re-growth, no apparent grazing
Day 9	Lobalangit to Kitgum border	2.50	Very significant un-grazed stover	Clearing for planting	Mixed swards with regrowth

Regarding this year's dry season grazing patterns, it appears that the mobile herds and flocks are following traditional routes outlined in Table 3. The Mission also notes a significant presence of Kenyan herds belonging to Turkana in areas of sub-counties from Kalapata in Kaabong through Nakapelimoru in Kotido to Rupa in Moroto districts. This was similar in Amudat district, by Pokot herds; a migration that is apparently higher than normal, due to pressures across the border in Kenya on both pasture and

water. The Mission's assessment of residual grasses suggests an average mean of 0.38 tonne/ha, a level lower than the daily means scored elsewhere, except in the ranges between Kotido and Panyangara, from where the Jie mobile units had already left for Angorum, Abim and, ultimately, Agago to find fresh grazing. Already the water level in the Kobebe dam appears to be low given the rainfall during 2013. However, at the time of the Mission visit in mid-February, it rained heavily for 2 hours, possibly presaging an early start to the season.

The final leg of the Mission's transect circuit from Karenga in Kaabong District to Kacheri in Kotido District and onwards to Abim was thwarted by an impassable dry river fording place in the southern Lobalangit ranges. Consequently, the Mission Team returned to Abim was via Kitgum and Agago Districts. The latter district is noted as being a stated target of mobile units of Jie herding households from Panyangara and where the residual grasses were noted to be intact, transect observations suggested yields of un-grazed perennial grasses of about 3 tonnes of low-quality forage per hectare in bush-fallow systems.

3.4 Livestock diseases and disease control in 2013/14

Updated information from Karamoja was provided by key informants including the District Veterinary Officers (DVOs) in Moroto, Kotido and Kaabong; the District Production Officer (DPO) in Abim; senior veterinarians in the two prominent community animal health worker associations JiCAHWA (Jie) and DoCAHWA (Dodoth), who also provided access to their records; and the Chair of the Karamoja Pastoralists Association. In addition, during Mission transects, team members obtained spot information on disease profiles of herds and flocks during semi-structured interviews.

The current general animal disease profile is considered by the Mission to have been low, with no noted epidemics. The major points to emerge regarding livestock health may be placed into the two categories of current diseases/controlling measures and information level. Regarding the former, major disease concerns of 2013/14 connect to the endemic diseases such as CBPP, CCPP, tick-borne diseases (anaplasmosis and babesiosis), East Coast fever, goat plague (PPR), footrot, endoparasites and ectoparasites. The rainy conditions throughout 2013 are likely to have exacerbated the disease challenge, ameliorated only by two-dekad dry spells in May–June and in July in some districts, which broke cycles of infection. By the same token, ability to move will have enhanced the usefulness of curative drugs provided that the herders were advised *always to move after dosing*, rather than risk immediate re-infection.

Regarding outbreaks of such diseases during the past twelve months, the Mission notes reports of ring-vaccinated CBPP and PPR outbreaks in Kotido and Kaabong; herder reported cases of lumpy skin disease, East Coast Fever and anaplasmosis in Nakapiripirit; a report of diarrhoeal syndrome akin to PPR in Rupa; and concerns expressed by veterinarians in Moroto regarding an increase in tick and worm burdens due to the wetter season and more pasture. During walking transects of cattle herds for PET body condition scoring, the Mission Team noted ticks only on animals in the Moroto dry season grazing areas around Kobebe, but they were practically absent among about 1 000 heads observed closely in the other grazing areas, in the markets of Amudat and Kotido and in visited kraals.

The disease challenge of current greatest concern noted by the Mission is a reported increase in trypanosomosis. This disease is endemic and it affects both humans (sleeping sickness) and domestic livestock (*nagana*) for which there are no vaccines. Carried by the tse-tse fly in forested areas, the disease causes debilitation and death and is consequently the cause of un-grazed belt of land across the middle of Africa. In Karamoja, it is one of the reasons why farmers in the western, wetter districts prefer to not keep many livestock. Reports to the Mission, by all senior veterinarians, confirmed increases in clinical cases. Further, the common explanation for the increase connects directly to the egress of buffalos from the Kidepo Valley National Park in Kaabong District. The buffalos, who are trypano-tolerant, act as walking reservoirs of the disease when they migrate into the cattle ranges. Since the success of the Disarmament Policy, herders close to the Park (and elsewhere) no longer bear arms, with significant reduction in their capacity to curtail buffalo movements.

Tse-tse fly controlling practices in the 1940s and 1950s, before the establishment of the Kidepo Valley National Park, involved the cutting of trees and spraying of vegetation, but since the creation of the park in 1964, with growing environmental awareness, neither strategy is presently appropriate and there is no longer any form of effective disease prevention. According to the Chair of the Karamojong

Pastoralist Association, buffalos are following migratory routes that are taking them up to Amudat in the east, Abim in the west and Napak in south-central Karamoja. Whereas the Mission Team failed to spot buffalos, tse-tse flies were apparent during transects in Karenga and Lobalangit (on the road to Kacheri). Further, the Mission Team can confirm that herder concern is high as trypanosomosis treatment drugs were by far the most frequently made purchases, sold from the DoCAHWA drugs store in Kaabong. Such sales were identified by a review of the drugs sold during a sample period from August to November 2013.

A trypanosomosis treatment programme in 2013 supported by FAO and VSF-Belgium, treated 30 000 heads. However, repeat doses every four months are necessary to be effective in controlling the disease. Grazing/livestock management may go a long way in avoiding or lessening risks, but movements depend on the right to roam. One preventive technique involves pouring a insecticidal drug along the back of the animal. This action not only kills all tse-tse flies, but also ticks and any flying insect landing on the animals. Therefore, each treated animal becomes a “walking trap”; a combination of cure by injection and control by this pour-on that is reported to have already reduced infestation rates in private farms in districts neighbouring Karamoja.

Regarding information levels, the disease profile of an area is usually determined by analysing reports of incidents, outbreaks and recorded treatment of clinical cases. In the case of Karamoja region, a disease surveillance system was established earlier with FAO support. The system, quoted as being extant by livestock experts and veterinarians met by the Mission in Kampala, appears to be breaking down. Using the situation in Kotido as an example, the Mission Team reviewed all the JiCAHWA surveillance returns for the past two years and found that the system worked well up to December 2012. Thereafter, a breakdown appears to have started that caused returns to dwindle and by the time of the Mission (February 2014), no surveillance returns were available mid 2013 onwards. Similar returns from DoCAHWA were not available for review. The decline and fall of JiCAHWA surveillance connects to the removal of a subvention paid to the CAHWA to do the work. However, in Moroto and other districts under the aegis of VSF, Belgium, it appears that the subvention of a mere UGX 25 000 per month per CAHW is continuing and surveillance is ongoing. As vaccination programmes are now based on isolating disease outbreaks when they occur through ring-vaccination campaigns creating a cordon sanitaire, rather than blanket vaccinating of all stock, successful disease control depends on effective surveillance followed by prompt action. The Mission’s findings that surveillance has broken down within the most powerful and well organised CAHWA in Karamoja is, therefore, a cause for concern.

Equally worrying is the fact that, despite the continuous presence for some decades of government veterinary officers and NGO supported programmes there is a complete lack of recorded knowledge of basic livestock production parameters that could help placing the importance of livestock diseases into context. Data for birth rates, neo-natal mortality rates, post-weaning survival percentages, returns to service, and calving intervals have, apparently, never been collected. Changes in body condition through the seasons, that can indicate undernourishment, parasitic burdens at an early stage, metabolic disorders or simply poor livestock management, go unnoticed and unrecorded. Improvements in herd and flock management have, hitherto, been ignored, in favour of vaccinations or anti-biotic treatments that may not now be the appropriate solution to low levels of production. By the same token, exotic breeds are being introduced in some agro-pastoralist field schools via projects, without a preliminary good understanding of the performance levels of existing indigenous breeds and what they could achieve under improved management practices.

3.5 Current stocking rates and livestock population estimates for 2014

Although the Mission Team was unable to gain access to the latest UBOS summary for more recent years, the 2014 estimates of livestock populations in each district were provided to by the DVOs in Kaabong, Kotido and Moroto. The estimates have been compiled to match the previous boundaries used by UBOS before the new districts of Amudat and Napak were created and are reported in Table 4. As estimates for Nakapiripirit were not available, 2014 figures were established by extrapolation from the changes noted in the other districts.

The 2014 DVOs’ estimates point to about 1.8 million heads, with a significant drop in livestock population compared to 2008 UBOS data. The fall in total number of head in each district for all species averages 70 percent. Disaggregating the data by species suggests that the population of cattle has

been reduced by 75 percent for cattle, goats by 68 percent and sheep by 65 percent. If such data truly reflect the current livestock population, then, the prevailing stocking rates are in the order of 702 000 TLUs grazing a possible 1.4 million ha or approximately 0.5 TLU per ha. This is a much more likely order of magnitude than the 1.92 TLUs/ha previously reported in section 2.3, Table 2. It is also close to the order of magnitude of annual stocking rates observed[6] in Kenyan dry-lands (300 mm to 800 mm rainfall per annum) from 0.2 to 0.6 TLU per ha. This quick analysis does provide an explanation for both the quantity of residual forage observed and the excellent/good body condition of all species recorded during the Mission transects.

Livestock population estimates based on DVOs data collected by the Mission Team differ from the MAAIF's target for the 2013/14 vaccination program of approximately three million heads (1 million cattle plus 2 million sheep and goats). However, even using the 3 million figure, the 2013/14 stocking rate would be about 0.86 TLU/ha, less than half the value based on 2008 UBOS data.

Table 4: DVOs livestock estimates for 2014 (compared with 2008 UBOS data)

District	Cattle	Goats	Sheep	Total head
Kaabong	103 000	112 000	113 000	215 000
Kotido	280 000	300 000	380 000	960 000
Moroto	165 000	180 000	200 000	545 000
Nakapiripirit	143 137	174 687	136 921	454 744
Abim	20 000	54 354	12 236	86 591
Total livestock (2014 estimates)	**568 000**	**646 354**	**592 236**	**1 806 591**
UBOS 2008 estimates	*2 253 960*	*2 025 293*	*1 685 502*	*5 964 755*
Change from 2008 to 2014 (%)	**-75**	**-68**	**-65**	**-70**

Source: Napak data with Moroto; Amudat data with Nakapiripirit; Nakapiripirit based on percent change in Kaabong, Kotido and Moroto; Abim increase of sheep/goats is based on increase of cattle provide by DPOs.

4. LIVESTOCK BODY CONDITION

In the absence of production data, livestock body condition score is a suitable indicator of the status of herds and flocks, providing information about their likely performance during recent months and how they should be managed in the near future. Changes of livestock body condition are an even better indicator. In this respect, the Mission set out to establish existing body condition scores at the end of the dry season as both a *one-off* indicator of the state of Karamoja livestock in each district and to produce the first record in what should become a regular method of assessing livestock condition using a simple, standard operating procedure of recording condition three times a year.

Due to the rapid nature of the Mission, all herds and flocks passed during vehicle and walking transects were scored according to a scale from 1 (poor) to 5 (very good). Depending on time availability during the transect, animals were often scored as a group and not individually. With good levels of confidence, goats in all locations were predominantly noted to be tightly positioned in score 3, sheep ranged between 2 and 3 and cattle ranged from 2.5 to 3.7 as noted in the average daily scores by species and by day of transect given in Table 5. In general, the average scores show that all species were in good or very good body condition for an assessment conducted in February at the end of the dry season.

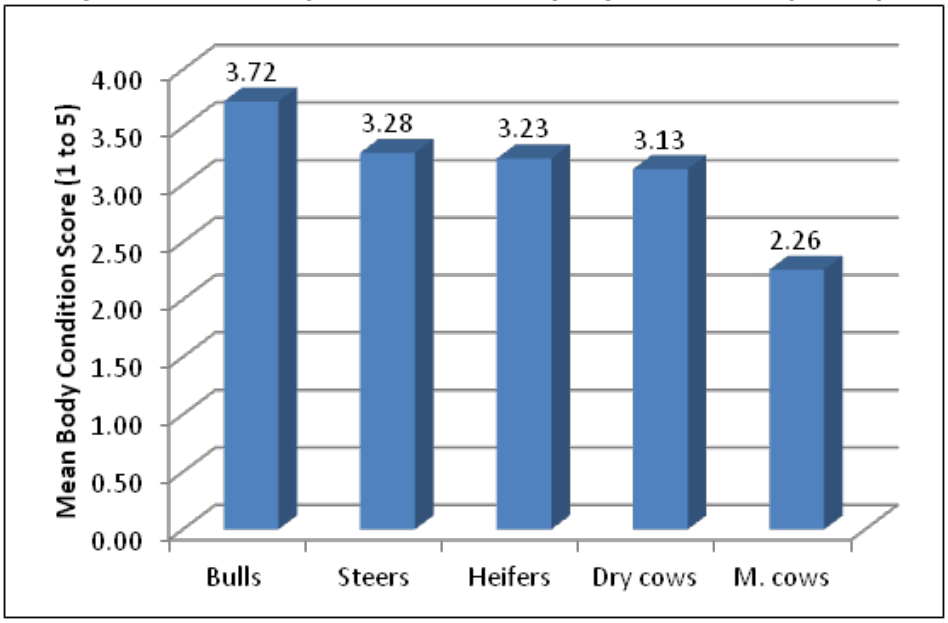
[6] Solomon B. et al. (1991), Maasai herding: an analysis of the livestock production system of Maasai pastoralists in eastern Kajiado District, Kenya. ILCA Systems Study 4. ILCA (International Livestock Centre for Africa), Addis Ababa, Ethiopia.

Table 5: Livestock body condition (daily average scores, ordered from South to North)

Daily means	1	2	3	4	5	6	7	8	9
	From South								to North
Cattle	3.7	3.5	3.2	3.3	3.3	3.3	3.3	2.5	2.5
Goats	3.0	3.2	3.1	3.6	3.2	3.5	3.2	3.0	3.0
Sheep	n/a	3.5	3.3	3.5	3.2	3.1	2.6	2.2	2.3

Cattle are noted as the livestock whose body condition is most clearly influenced by class (sex and physiological state), an effect masked by general group-scoring. Therefore, cattle were chosen by the Mission Team for a more detailed scoring of individual body conditions by location and by class of stock. Such individual scoring was conducted during walking transects in the ranges, water points, kraals and markets, and the Mission Team scored the body conditions of a sample of about 760 assorted bulls, steers, heifers, dry-cows and milking cows. The overall weighted means of each class of cattle are shown in Figure 4.

Figure 4: Cattle body condition scores (weighted means by class)



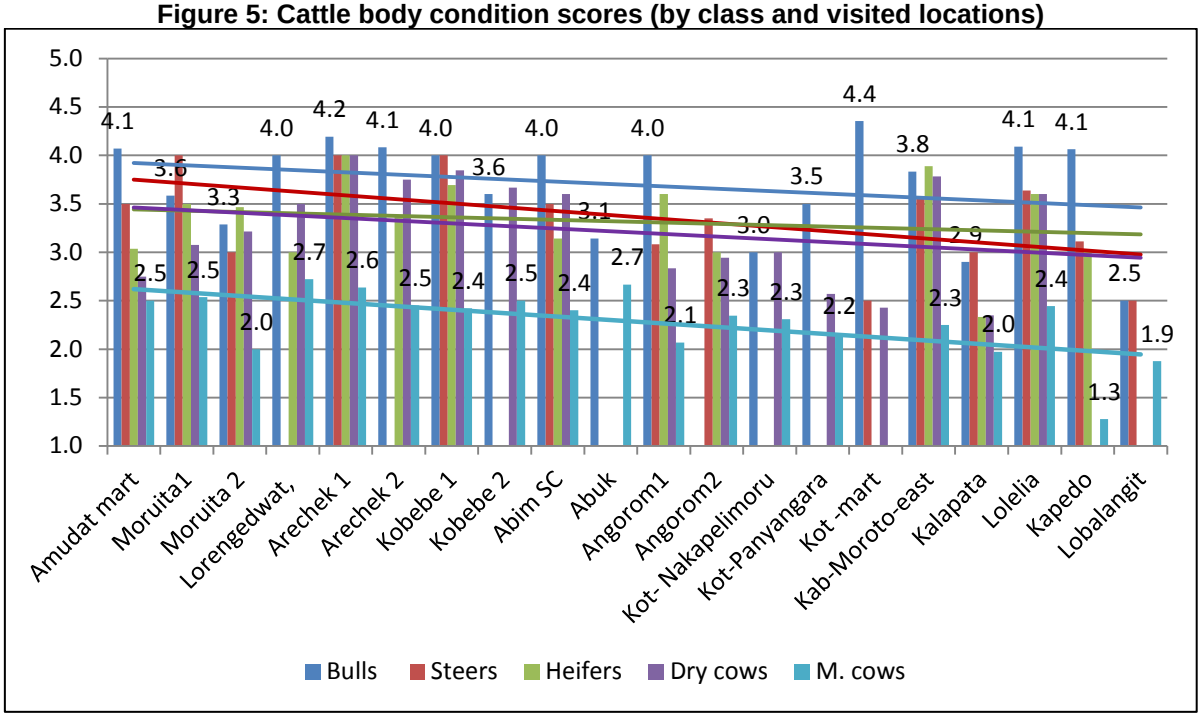
The weighted mean scores of the classes of cattle confirm the general impression of the Mission Team of high levels of body conditions of most stock observed in all districts during the vehicle–based transects. The disaggregated data set reveals a significant difference between milking cows (mean 2.26) and the other classes. This result is to be expected as milking cows observed are coming to the end of their lactations and traditional management does not include supplementary feeding. Therefore, milking cows' *milk off their backs* i.e. mobilizing body tissue to meet the increased nutritional demands that cannot be met by aging pasture irrespective of the quantity available causes body condition to drop. In addition, at household level, where most milking cows are kept, the herds are quite often grazed by young children. The younger the child, the shorter the radius of movement in what is already deteriorating pasture, exacerbating the condition loss, except where fields of stover (also of low digestibility and slow rate of passage) are available. Although several simple techniques are available that might ameliorate nutritional levels for *manyatta*-based milking cows, observations through the seven districts suggest that they are not practised anywhere.

Figure 5 shows mean body condition scores for cattle by class and by location, arranged from south to north in the graph from left to right. It is evident that, for each specific class, there is a downward trend moving from south to north. In addition, Figure 6 shows also that:

- Milking cows exhibit the lowest mean scores at all locations and do not rise above 2.7 and fall to 1.3 in one the cluster of stock near Kapedo (tse-tse fly-affected area) and 1.9 in northern Kaabong (where two protected kraals still extant).
- Bulls are the only class consistently exhibiting mean scores above 4 and the highest scoring bulls are noted in Kotido (Kanawat) market.

- The lowest mean score for steers is noted to be in Kotido (Kanawat) market, suggesting a possible trade in store-stock (animals to be fattened by the buyers).
- Dry cows noted in both Amudat and Kotido markets have much lower scores than dry cows in the ranges, kraals and water points in all the other areas, suggesting that they are *cull cows* being purchased by butchers, rather than animals waiting to calve.
- In Kalapata, where two protected kraals still exist, the scores are lower than in all other locations, except for steers.
- All classes show trend lines decreasing from south to north, which, although influenced by the scores of herds in the Kalapata cluster, may also reflect the effect of trypanosomosis.

Figure 5: Cattle body condition scores (by class and visited locations)



5. LIVESTOCK PERFORMANCE

As noted earlier, the data needed to calculate the basic indicators of livestock performance do not exist. Therefore, case-study returns regarding livestock production emanating from semi-structured interviews cannot be verified by observations of records.

Herd and flock structures noted by the Mission during the case-studies and confirmed during key informant interviews suggest that in the main livestock rearing areas the structures are typical of self-replacing, extensive livestock systems. Regarding the agro pastoralist/pastoralist herds and flocks:

- At least 60-70 percent of the animals are female being either breeding females or herd/flock replacements.
- Numbers of breeding females and herd/flock numbers generally are increasing having fallen dramatically during the period of protected kraals.
- First calving is at 3-4 years of age, while lambing/kidding is at around 2 years.
- Calving percentage last year (2013) is noted at 60 to 65 percent and follows two good rainfall years.
- Lambing and kidding percentages are noted to be 80 to 100 percent.
- Neo-natal mortality rates are reported to be high at 20 percent for cattle and 30 percent or higher for small ruminants. These are low compared to 70 percent neo-natal mortality rates reportedly occurring during the period of the protected kraals reported, they are still very high.
- Adult mortality rates are estimated at 10 percent for cattle and 15 percent for sheep and goats, being normal rates under extensive systems of management.
- Male breeding animals are kept at ratios ranging from 1:10 (cattle) to 1:30 to 1:70 females (sheep and goats).

- Other ruminant livestock kept in the herd/flock for sale as part of the *business* of herding comprise:
    - Bulls waiting to be sold for slaughter at some 4-5 years old.
    - Steers (castrated males) to be sold as draft animals (oxen) or as store-stock (animals for fattening elsewhere).
    - Sheep and goats aged 2+ years for sale when they acquire enough size to be an economic proposition for local butchers;
    - Barren/old females waiting to be sold as culls for butchering at a lower price than the fat stock noted above.
    - Heifers or gimmers (2 years old female sheep/goats, surplus to requirement for herd or flock female replacements).
    - Old bulls, no longer needed for service.
- Following household needs, livestock stock may be sold earlier at younger ages than noted above or other members of the herd or flock may be sold at any time.

Using the production parameters and the expected patterns of sale noted above, the Mission calculated that a five breeding-cow herd is the smallest herd that may be both self-sustaining and income generating. As an example of probable incomes from livestock from self-sustaining herds, numbers of saleable livestock and replacement females per year for cattle herds containing 5, 10 and 15 head of cows of breeding age are given in Table 6[7].

Table 6: Generation of saleable cattle stock and herd replacements per year

Number of breeding cows	Calving rate (%)	Neo-natal mortality rate (%)	Adult mortality rate (%)	Saleable stock (per year)	Female herd replacements (3 years old)	Number of cows in 10 years
5	60	20	10	one young male	one per year	8
10	60	20	10	1.5 mature bulls and 1.5 cull cows	1.5 per year	13.6
15	60	20	10	2 bulls and 2.5 cull cows	2.5 per year	23.9

Using average prices observed by the Mission Team during market visits, the incomes resulting from annual sales may be as follows:

a) About UGX 300 000 per year in the case of a 5 breeding cow herd selling one young male.
b) About UGX 2.1 million per year in the case of a 10 breeding cow herd selling 1.5 mature bulls (UGX 1.8 million) and 1.5 cull cow (UGX 300 000).
c) About UGX 2.9 million per year in the case of a 15 breeding cow herd selling 2 mature bulls (UGX 2.4 million) and 2.5 cull cows (UGX 500 000).

For sheep and goats, using the indicators provided from this year's case studies, the 5 breeding-ewe flock is the smallest herd that may be both self-sustaining and income generating. Examples in Table 7 below show the performance of flocks with 5, 25 and 50 breeding females.

Using observed prices, the income resulting from annual sales may be as follows:

a) About UGX 60 000 per year in the case of a 5 breeding ewe/doe flock selling 1 two-year old male.
b) About UGX 410 000 per year in the case of a 25 breeding ewe/doe flock selling 4.5 two-year old males (UGX 270 000), 4 cull ewes or does (UGX 80 000) and one surplus gimmer (UGX 60 000).
c) About UGX 940 000 per year in the case of a 50 breeding ewe/doe flock selling 11 two-year old males (UGX 660 000), 8 cull ewes or does (UGX 160 000) and 2 surplus gimmers (UGX 120 000).

[7] The format for the calculations is presented in the progression tables included in Annexes 3 and 4 for female stock for two examples, 5 cows and 50 ewes. Production progressions for males are the same as the females as a 50-50 sex ratio at birth is anticipated, with no differences in mortality rates in later years.

Table 7: Generation of saleable sheep/goats stock and flock/herd replacements per year

Sheep/goats breeding females	Birth rate (%)	Neo-natal mortality rate (%)	Adult mortality rate` (%)	Saleable stock (per year)	Female herd replacements (two years old)	Number of ewes/does in five years
5	90	30	15	1.5 young males	1 per year	5
25	90	30	15	4.5 2-year old males, 4 old cull ewes and 1 surplus gimmer	5 per year	28
50	90	30	15	11 2-year old males, 9 cull ewes and 2 surplus gimmers	10 per year	56

6. LIVESTOCK MARKET ANALYSIS

The Karamoja region has a number of markets engaged in trade of livestock, but many of them register only a minimal volume of sales, mainly for local use. Major terminal markets are located in Kotido, Kaabong and Amudat districts and they are supplied by traders that assembled livestock in intermediate trading centres, especially in pastoral and agro-pastoral areas, but also by a significant number of individual pastoralists. Transactions occur through individual negotiations and are often facilitated by a translator. Sellers accept cash or barter, particularly for sorghum. Cattle is primarily sold to traders from outside Karamoja, including Pader, Lira, and Gulu districts, for immediate slaughter and wholesale to butchers. However, a fairly well-developed road network linking large towns with borders allows a steady flow of livestock exports to neighbouring South Sudan and Kenya.

During the last three years, prices of livestock have followed an increasing, albeit irregular, trend in most markets (see Figure 6). The trend is especially noticeable in Kotido livestock terminal market, the largest of the region, where average 2013 prices of heifer, goats and sheep were 54, 57 and 69 percent higher, respectively, than average 2011 prices. Livestock prices have increased over the last three years also in Moroto and Kaabong markets, albeit at slower rates, while in Nakapiripirit market, despite a marked volatility, prices of sheep and goat did not increase, while prices of heifer declined over the same period. A sharp decline in prices can be observed in January 2014 in Kaabong market, located in the northeast of the region bordering South Sudan: prices of heifer, goats and sheep declined by 37, 22 and 27 percent, respectively, between December 2013 and January 2014, mainly as a result of the reduced demand from South Sudanese traders, caused by the civil conflict erupted in South Sudan by mid-December 2013.

An important determinant of the increasing trend in livestock prices observed in most Karamoja markets is the significant and widespread improvement of livestock body conditions after the demise of the kraal protection system. During the Mission's visits to markets, it was evident that the majority on the presented animals was in good/excellent body and health conditions, challenging the common understanding that Karamojong people tend to sell only old and sick animals.

A key role in price setting is also played by the interaction between livestock supply and demand. Local supply seems to be quite inelastic to prices movements. Pastoralists' decisions to sell their animals are generally driven by the goal to cover some seasonal needs in terms of food, school fees, ceremonies and other recurrent expenses, even when local market price are at low level. Conversely, when market prices are high, there are technical limits to the number of animals to be sold in order to avoid a process of herd destocking. In addition, livestock ownership is an important indicator of social status within Karamojong communities, often limiting herders' interest into market sales despite attracting high level prices. On the demand side, it is evident that there is a high and increasing number of traders both from Ugandan districts outside Karamoja and from neighbouring countries (Kenya and South Sudan) which exerts a strong and continuous pressure on livestock prices.

Figure 6: Trend of livestock prices in selected markets
(prices of sheep and goats on the left axis; prices of heifer on the right axis)

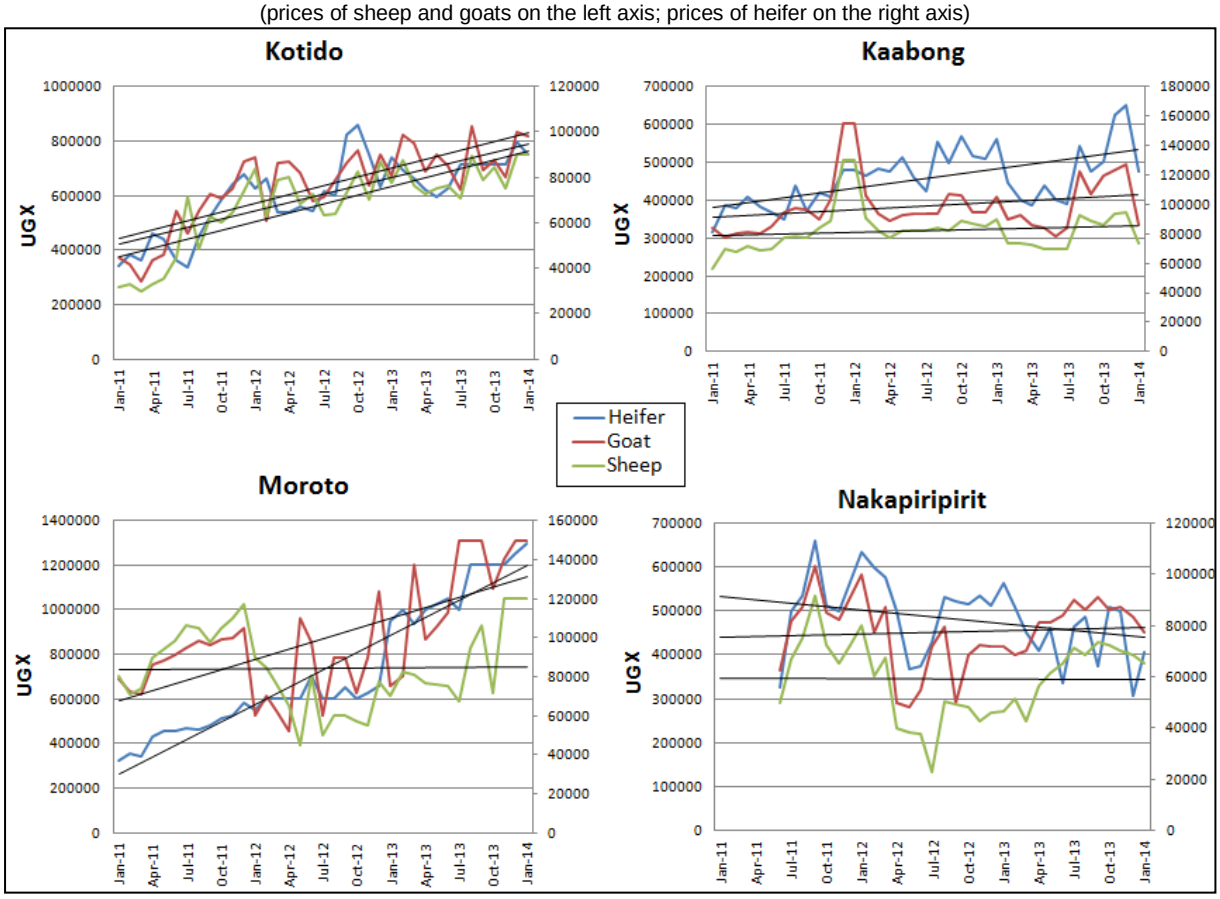
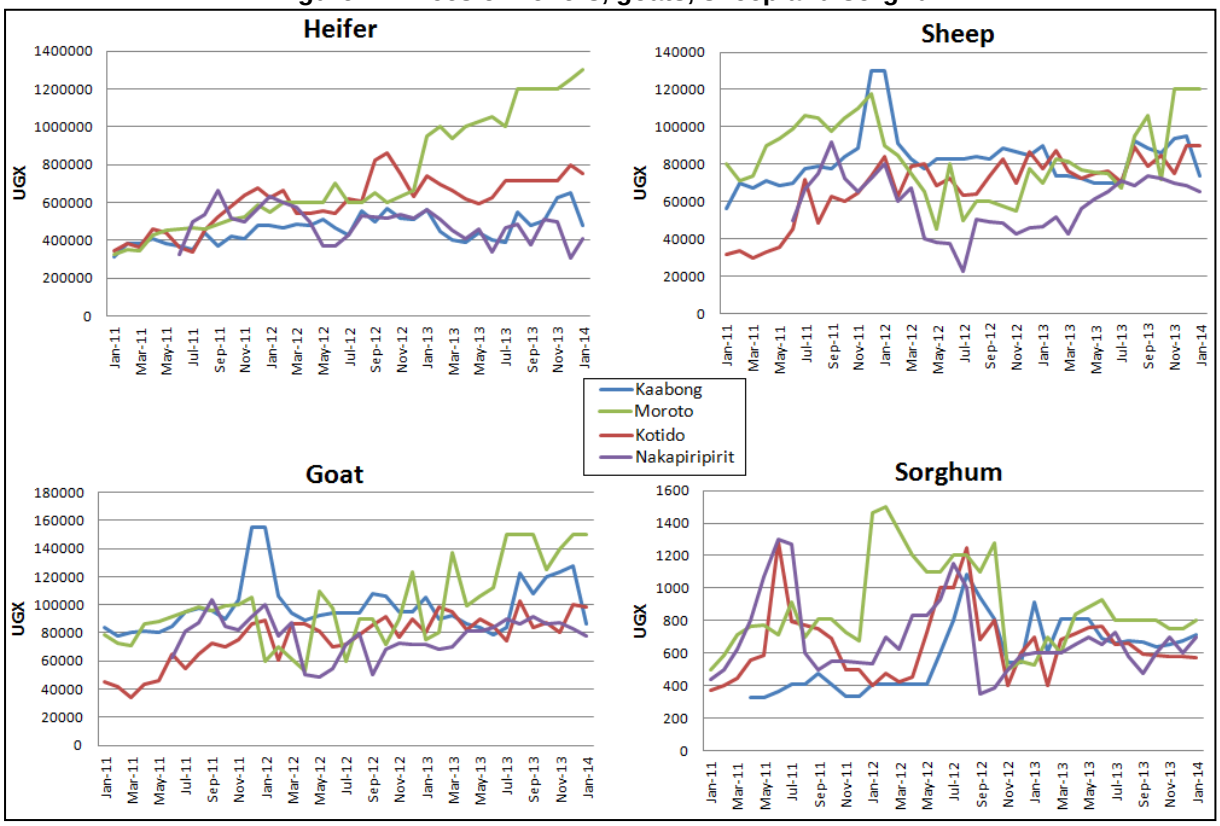


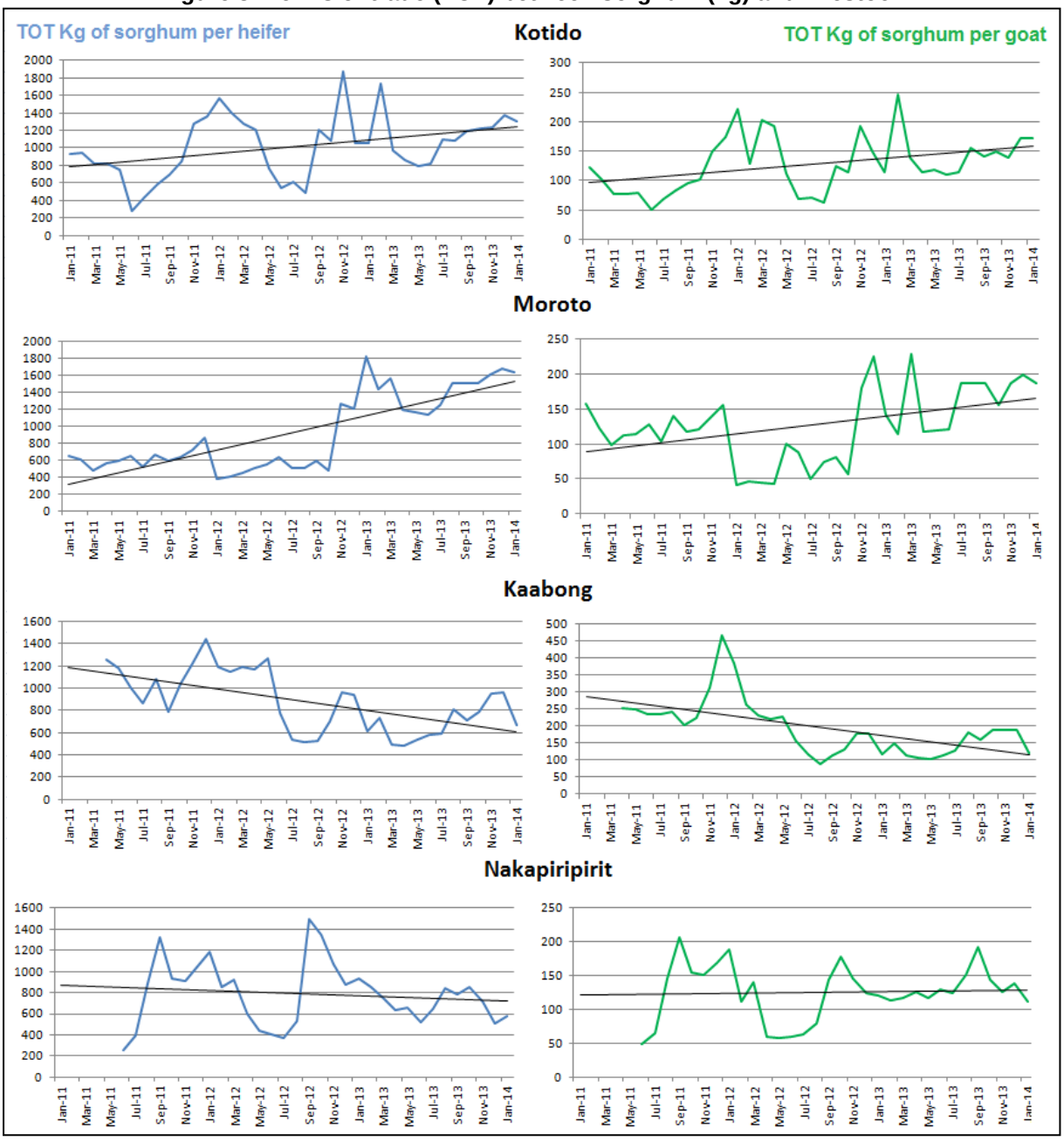
Figure 7 compares prices among markets and it shows the existence of significant price differentials for livestock and sorghum between markets, illustrating limited spatial market integration. Prices of livestock in Kotido market generally command higher prices than in the other monitored markets. This is mainly due to the fact that, being Kotido the largest livestock market of the region, demand pressure is high and livestock sellers present livestock in particularly good condition, to make profit of the purchasing power of wealthier buyers from outside the region or outside the country. Apart from this, prices show a marked volatility over time and considerable differentials between markets in the same reference period, mainly as a result of the compounding effects of insecurity and inadequate infrastructure, most notably of all weather-paved roads. Most rural feeder roads become impassable with motor vehicles during the rainy seasons, reducing the number of presentations, increasing marketing costs and compromising overall market functioning.

Figure 7: Prices of heifers, goats, sheep and sorghum



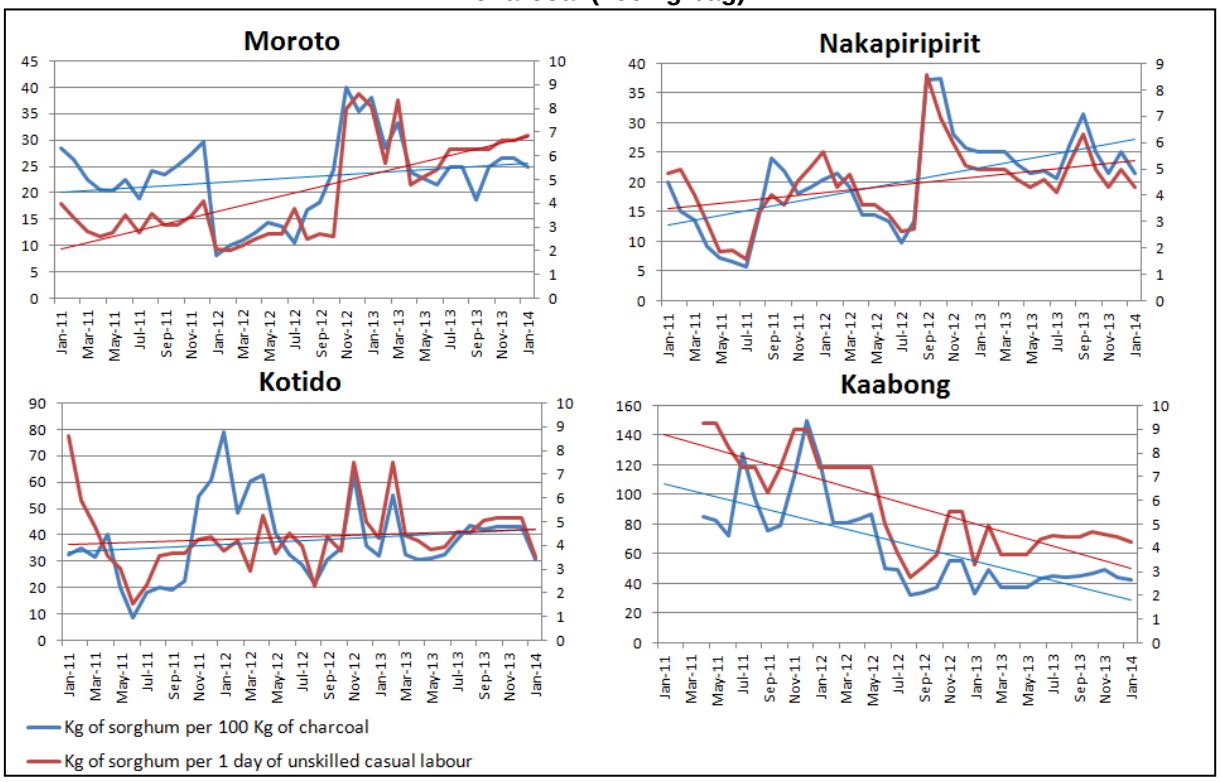
Prices of sorghum have been quite volatile between 2011 and 2012, going from UGX 40 000 to 140 000 per 100 kg sack. Since the beginning of 2013, sorghum prices have generally stabilized, with normal seasonal fluctuations, moving within a range of UGX 60 000-80 000 per 100 kg sack. In Kotido and Moroto markets, terms of trade for pastoralists have markedly improved since January 2011 (see Figure 8). On average, in 2013, a pastoralist in Kotido could sell a heifer and buy about 11 sacks of sorghum compared to 8 sacks in 2008. In Moroto, the difference is even wider as the sorghum equivalent of a heifer passed from 6.5 sacks in 2011 to 14.5 sacks in 2013. In Kaabong market, by contrast, terms of trade for pastoralist deteriorated as prices of livestock increased at a rate lower than those of prices of sorghum. In 2013, a pastoralist in Kaabong could purchase only 7 sacks of sorghum after selling a heifer compared to 11 sacks in 2011. In Nakapiripirit market, both prices of sorghum and livestock fluctuated within a small range between 2011 and 2013, leading to quite stable terms of trade for pastoralists (about 7-8 sacks of sorghum per heifer). The same trends are observed for the terms of trade between prices of sorghum and goats, with an average improvement by about 25-40 percent in Moroto and Kotido and an average decline by about 45 percent in Kaabong.

Figure 8: Terms of trade (TOT) between sorghum (kg) and livestock



Unskilled daily labor wage rates and prices of charcoal have increased in the last three years across the whole region, manly driven by the growing demand of urban centres. Since prices of cereals were generally quite stable, the purchasing power for casual workers and charcoal sellers have improved in recent years, with positive effects on household food security. Between 2011 and 2013, the average purchasing power (in terms of kg of sorghum) of one daily wage increased by 90, 36 and 17 percent in Moroto, Kotido and Nakapiripirit, respectively (see Figure 9). Similarly, in 2013, the sale of a 100 kg bag of charcoal was equivalent on average to 25-40 kg of sorghum, compared to only 15-30 kg of sorghum in 2011. Again, an exception is represented by Kaabong, where a limited increase in labor wages and charcoal prices was more than offset by the increase in cereal prices and terms of trade daily wages/sorghum and charcoal/sorghum have both declined by 50-55 percent between 2011 and 2013.

Figure 9: Terms of trade of between sorghum (kg) and unskilled casual labour daily wage or charcoal (100 kg bag)



7. CONCLUSIONS

Rainfall performance in 2013 has been generally good, with pasture production near to the long–term maximum estimates in most districts. Access to pasture has dramatically improved since the dismissal of the protected kraal system that allowed herders to properly manage their animals and return to traditional grazing routes. The assessment of high residual pasture availability confirmed the remote-sensed NDVIs readings which show greater vegetation coverage with browse and perennial grazing than the long–term averages. The high level of residual grass and browse availability is reflected in the overall good livestock body condition of all species, even at the end of dry season.

The analysis of body condition scores and residual grazing biomass estimates offered valuable insight into the performance of stock during the past production cycle and the likely future performance of the same stock in the locations visited. These conditions suggested that 2013 off-take, in terms of the quantity of animal products (milk plus) and typical sales of stock (bulls, steers, cull cows; slaughter sheep and goats; old ewes and does) is likely to be have been better than in the recent past as animals are in better condition. Income generated by annual sales will depend on the size of the breeding unit of each herd and flock. According to Mission Team estimates, annual income may range from about UGX 60 000 of the smallest, self-sustaining unit with 5 breeding ewes or does to about UGX 2.9 million for a 15 breeding cow herd.

Livestock population estimates for 2014 are significantly lower than the UBOS 2008 estimates. The estimated reduction of about 70 percent conform to information from key informants and recent reports[8] regarding the significant losses suffered by most herders during the protected kraals system. Accordingly, Mission's estimates of stocking rate reduction from 1.92 to 0.50 TLUs per hectare of grazing resources between 2008 and 2014 are consistent with the observation of abundant availability of pasture and good body condition of all livestock types and classes during Mission's transects.

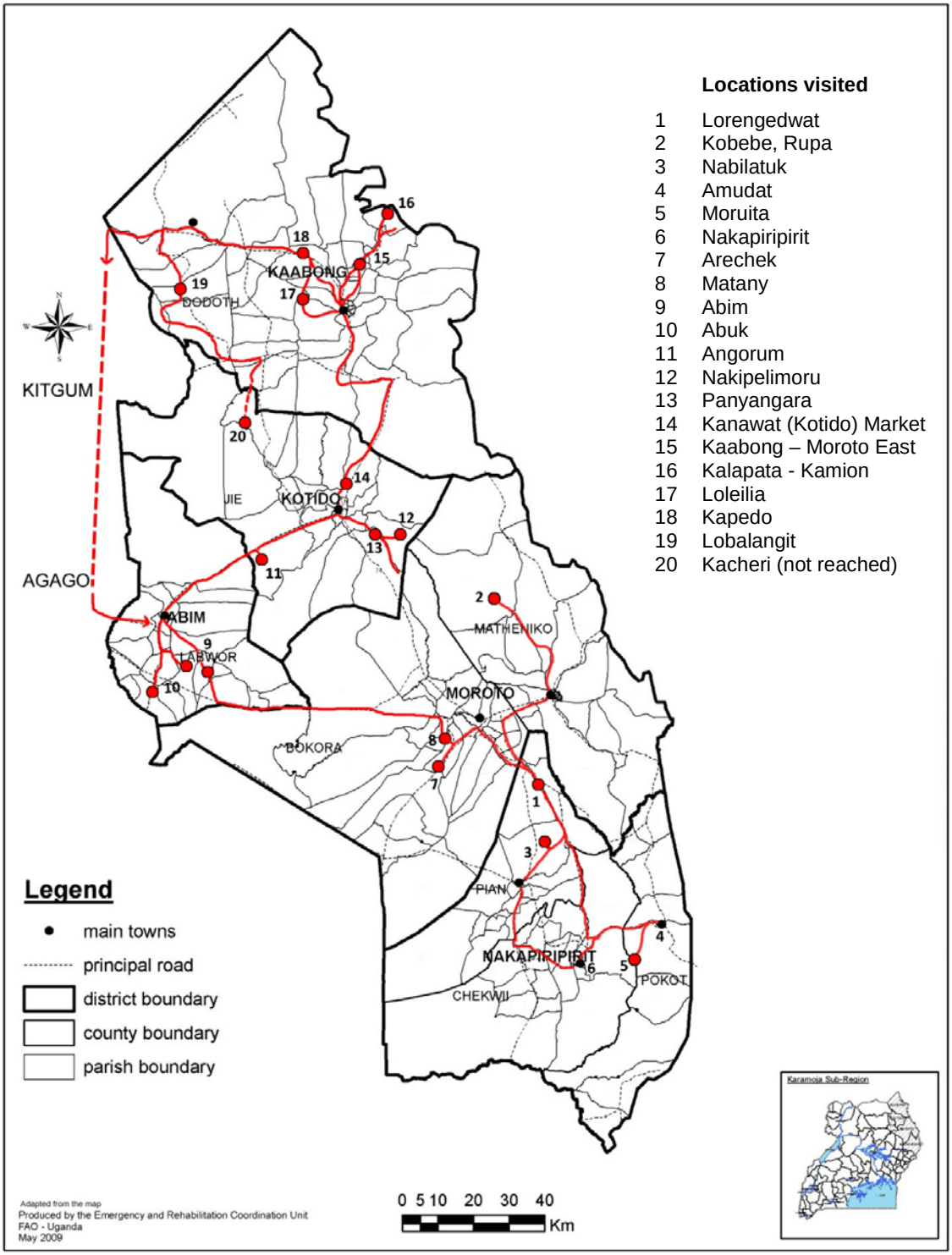
[8] Gelsdorf K. et al. (2012), Livelihoods, basic services and social protection in Northern Uganda and Karamoja, Feinstein International Centre; Vaughan J. and Stewart T. (2011), Uganda conflict and market assessment – Karamoja, Mercy Corps; Matthysen K. et al. (2010), The Karamoja cluster of Eastern Africa: arms transfers and their repercussions on communal security perceptions, International Peace Information Service

Placing a value of this assessment exercise from an institutional point of view is simple. All institutional stakeholders are now in possession of a simple base-line analysis, providing spot checks of livestock (cattle in particular) and pasture conditions at the end of the 2013/14 dry season. Similar data have, hitherto, been unavailable. Moreover, the Mission piloted a standard operating procedure for rapid assessments and it would be advisable to repeat the exercise at regular intervals (every four months) throughout the year in order to provide planners and programmers with the information needed to design and implement future interventions for better livestock management practices.

However, monitoring livestock and pasture conditions is only the first step. Once it is established as a regular activity, attention should be directed to obtain the information needed to generate technical and economic performance data. Presented Mission's estimates of income flows from livestock sales are only based on scattered evidence. Simplified record keeping of livestock performance, maybe through agro-pastoralist field schools, should be considered a priority in order to develop a database of indicators that may be used to plan interventions and then examine their impact.

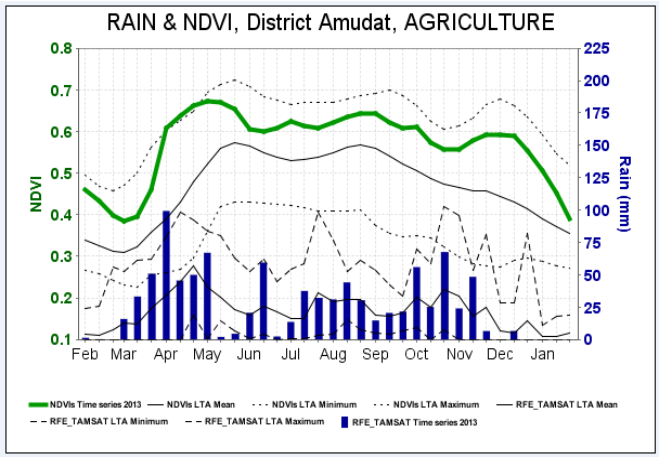
Annex 1

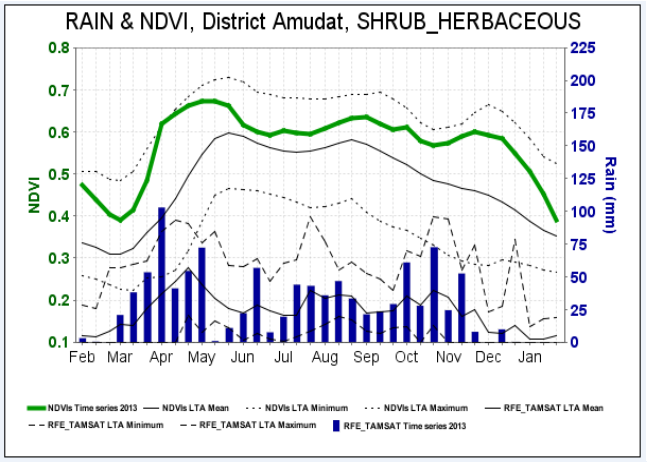
Itinerary (in red) of the 2013 FAO/GIEWS Livestock and Market Assessment Mission to Karamoja Region

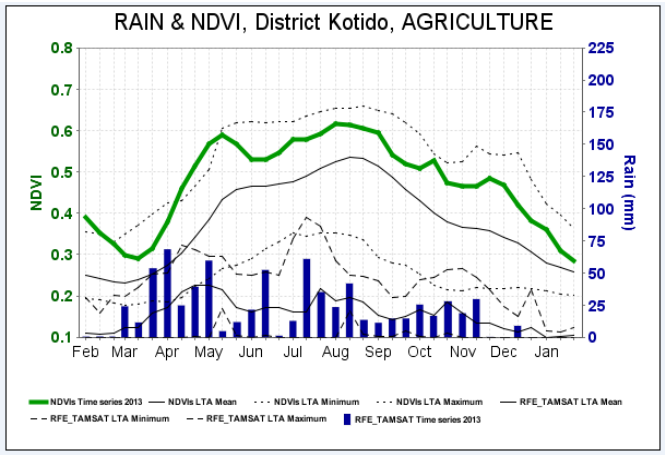


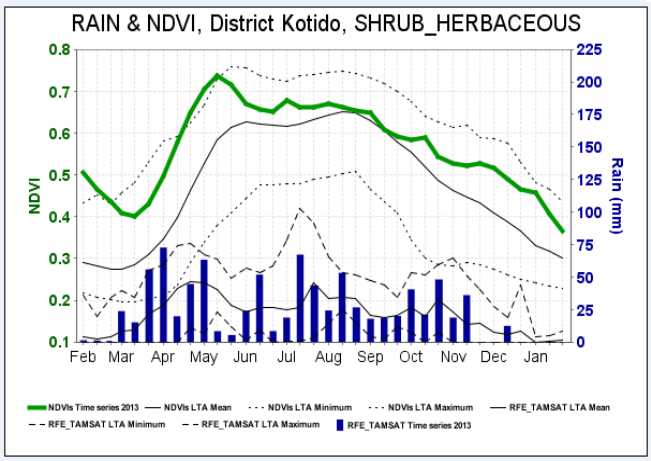
Annex 2

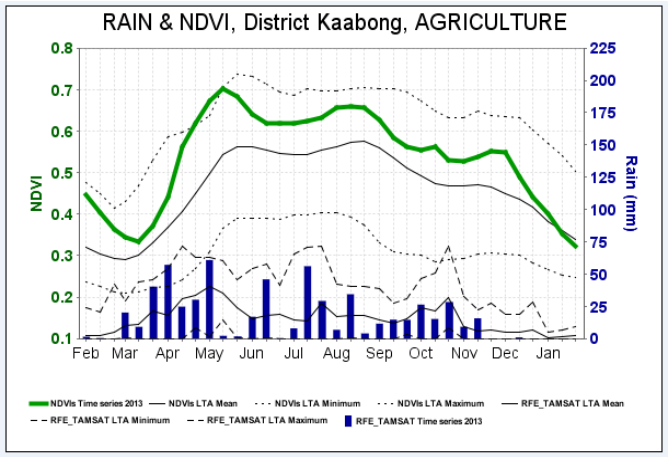
Rainfall Estimates and Normalized Difference Vegetation Index for agriculture and pasture by district (provided by VITO, Belgium)

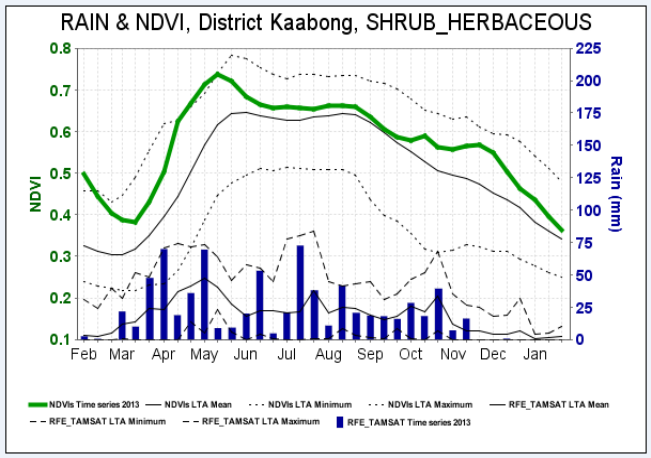


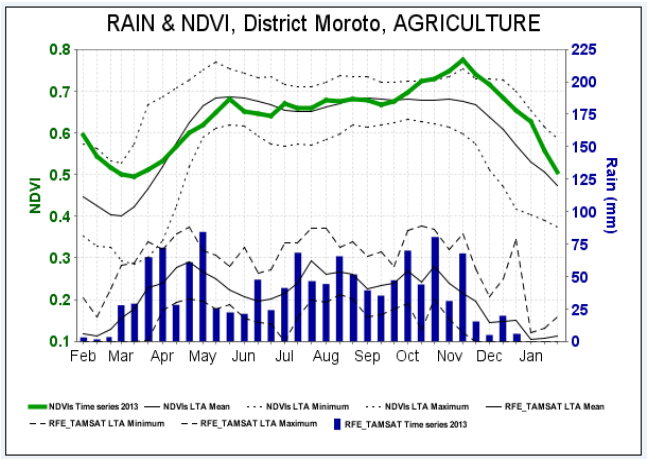











RAIN & NDVI, District Moroto, AGRICULTURE
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Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan
NDVIs Time series 2013
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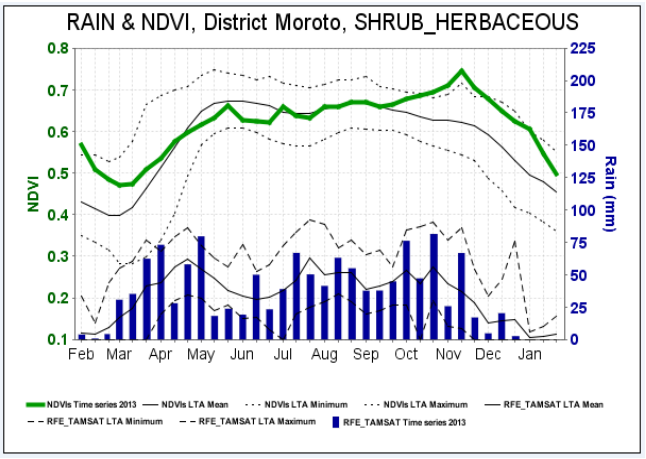
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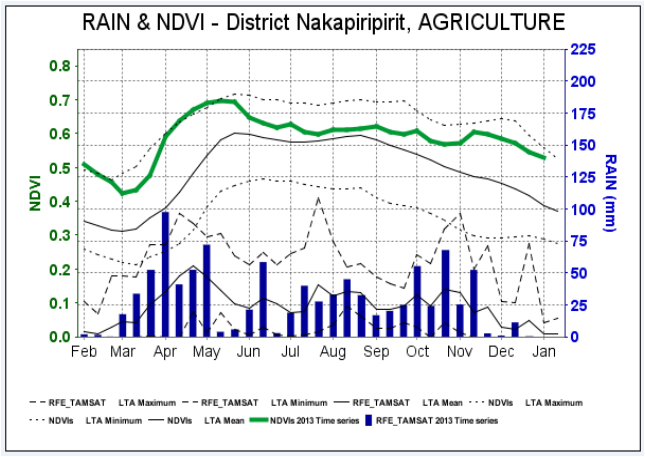
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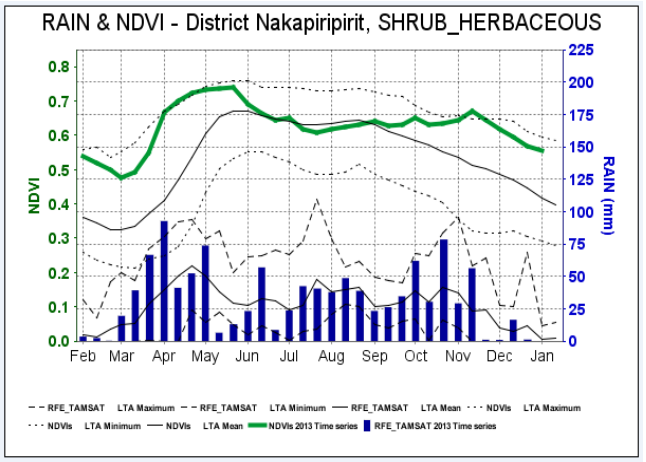
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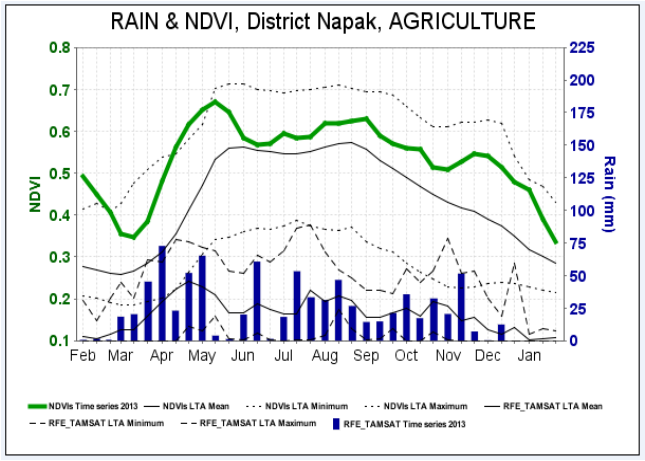
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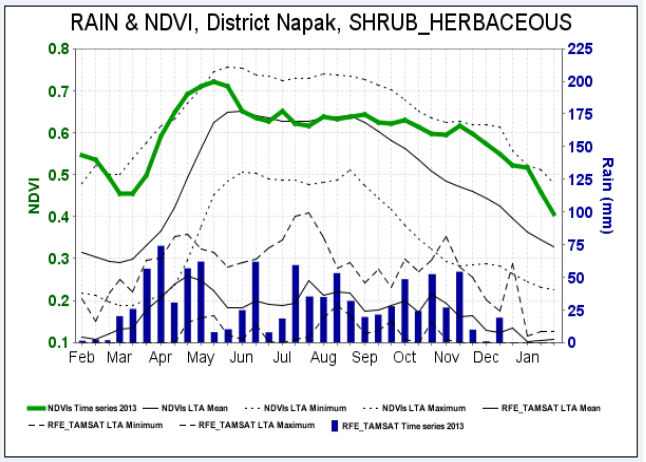
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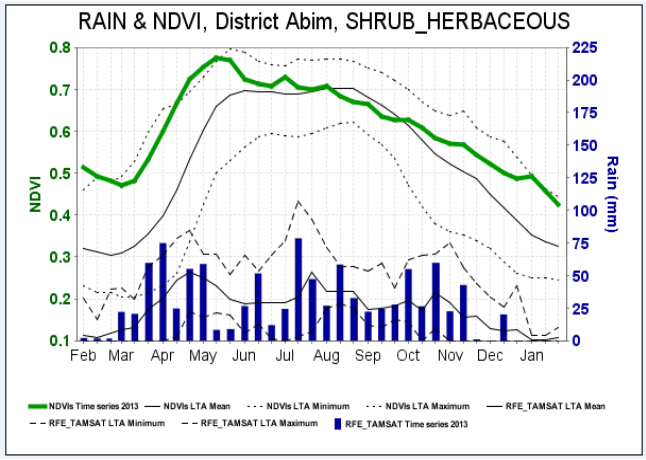
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Rain (mm)
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NDVIs Time series 2013
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RFE_TAMSAT LTA Mean
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Annex 3

Cattle herd stability and sales progressions starting with five breeding cows (females only; males have a similar development pattern), in percent

Yr	Total herd	Breeding cows	Calving	50% sex ratios	1st yr 20% mortality	yr 1, 10% mortality	yr 2, 10% mortality	yr 3, 10% mortality	yr 4 10% mortality	yr 5 10% mortality	yr 6 10% mortality	yr 7 10% mortality	yr 8 10% mortality	yr 9 10% mortality	yr 10 10% mortality
	100	**-10**	**60**	**50**	**80**	**90**	**90**	**90**	**90**	**90**	**90**	**90**	**90**	**90**	**90**
10	13.7	5.5	3.3	1.6	1.3	1.1	1.0	0.9	0.8	0.7	0.7	0.6	0.5	0.49	0.44
9	13.0	5.2	3.1	1.6	1.3	1.1	1.0	0.9	0.8	0.7	0.7	0.6	0.5		
8	11.9	5.0	3.0	1.5	1.2	1.1	1.0	0.9	0.8	0.7	0.6	0.6			
7	10.8	4.8	2.9	1.4	1.2	1.0	0.9	0.8	0.8	0.7	0.6				
6	9.8	4.6	2.8	1.4	1.1	1.0	0.9	0.8	0.7	0.7					
5	8.8	4.4	2.6	1.3	1.1	1.0	0.9	0.8	0.7						
4	7.7	4.2	2.5	1.3	1.0	0.9	0.8	0.7							
3	7	4.1	2.4	1.2	1.0	0.9	0.8								
2	7	4.5	2.7	1.4	1.1	1.0									
1	6	5.0	3.0	1.5	1.2										

Notes:

- Herd entrants: 0.8 heifer per year only after year three.
- Indicators are based on limited case study information not herd/flock records.
- The simple progression anticipates five cows starting with herd entrants after year three, a homogenous starting group and no recurrent differences have been applied to the equation.
- Off-take shown in text Tables 4 and 5 presume an established herd/flock with herd/flock entrants available in the first year.

Annex 4

Sheep flock/goat herd stability and sales progressions starting with 50 breeding females (females only; males have similar development pattern), in percent

Year	Total	Breeding sheep	Birth rate	50% sex ratios	Neo natal + 1st yr 30% mortality	yr 1 15% mortality	yr 2 15% mortality	yr 3 15% mortality	yr 4 15% mortality	yr 5 30% mortality
	100	**15% loss**	**90**	**50**	**70**	**85**	**85**	**85**	**85**	**70**
10	114	50	45	22	16	13	11	10	8	6
9	111	49	44	22	15	13	11	9	8	6
8	109	48	43	22	15	13	11	9	8	6
7	112	47	42	21	15	13	11	9	8	5
6	105	46	41	21	14	12	10	9	8	5
5	98	45	41	20	14	12	10	9	7	
4	89	44	40	20	14	12	10	9		
3	78	43	39	20	14	12	10			
2	67	43	38	19	13	11	10			
1	66	50	45	23	16	13				

Notes:

- Entrants coming into flock in year 3.
- Similar caveats apply as shown in Annex 3.