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Livestock, Wealth and Poverty in Karamoja

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Abstract
In pastoralist and agro-pastoralist areas, wealth and poverty is closed aligned to levels of livestock ownership. Whereas cash income per capita is a useful measure of poverty in non-pastoralist areas, measures of livestock ownership per capita reflect levels of poverty in pastoralist systems. This study estimated a livestock threshold for agropastoralist households in Karamoja, being the minimum per capita ownership of livestock needed to sustain a predominantly agropastoral livelihood. The study then applied the livestock threshold to pre-existing livestock demographic data to estimate the proportions of household above and below the threshold. Using an estimated livestock threshold of 3.3 Tropical Livesock Units (TLU)/capita for agropastoralism, 56.5% of households in Karamoja's main livestock-keeping districts were below the threshold and could be categorized as livestock-poor. The ownership of livestock was skewed in two main ways. First, there was high-end skew with the wealthiest 30% of households owning 69.3% of livestock in terms of TLU. Second, there was a low-end skew. Among poorer households, below the 3.3 TLU/capita livestock threshold, livestock ownership was skewed away from the threshold. 47% of these households owned only 1.2 TLU/capita or less; 13% of households owned no livestock at all. These findings are discussed, with programing and policy recommendations.

1. Introduction

1.1 Asset-based analysis of poverty in pastoralist areas: the livestock threshold

In pastoralist and agro-pastoralist households in East Africa, livestock not cash are usually the main financial asset. Although often viewed by central policy makers as irrational or backward, the ownership of large herds in dryland areas has a sound economic basis. In Karamoja, people manage their herds, *"… more like an investment portfolio. The primary management objective is to increase the value of their portfolio. Income is generated in the form of capital gains, not from the sale of livestock. When pastoralists sell animals, they are simply monetizing capital gains …"* (Rockmann et al., 2016). Therefore, an asset (livestock)-based approach to understanding poverty and livelihoods is particularly useful in pastoralist areas, as is an understanding of how household livestock assets change over time and why (Little et al., 2008). Livestock are also central to social capital in pastoralists areas, and enable a complex range of transactions, social networks and insurance. Across East Africa and the Horn of Africa, pastoralist's own descriptions of wealth and poverty focus on livestock ownership, not income, and a wealthy household owns relatively large numbers of animals (e.g. Potkanksi, 1999).

In the same way that a poverty line or income threshold is used in conventional poverty assessments, a "livestock threshold" can be used in pastoralist areas. The use of livestock thresholds dates back to the late 1960s, and an assumption that a minimum number and type of animals were needed to provide food to meet the needs of a pastoralist household. Using estimates of herd production, especially milk production, early livestock threshold analysis calculated figures of between 4 to 5 Tropical Livestock Units (TLU) per person (Pratt and Gwynne, 1977), equivalent to about 6 to 7 cattle, or 40 to 50 goats per person. However, these early studies assumed that there was minimal sale of livestock in exchange for cereals, and so minimal market engagement. Later studies took account of changes to pastoralist systems due to population growth, declining access to rangeland, increasing sales of livestock, and other trends. In these more market-based forms of pastoralism and agro-pastoralism, the calculation of a threshold herd depended not only on milk production and the direct consumption of livestock products, but also on the terms of trade between livestock and cereals. In these contexts, the livestock thresholds were often in the range of 2.5 to 3.5 TLU/person, but with variations according to local market values for livestock and grain.

1.2 Livestock poverty in Karamoja

The Karamoja sub-region has been experiencing an overall improvement in security since 2010 and a reduction in armed raiding. However, the government disarmament campaign that contributed to these changes is also associated with a dramatic decline in livestock population and an apparent redistribution of livestock, with wealthier households thought to now own substantially more animals than poorer households (Burns et al., 2013; Stites et al., 2016). If accurate, these changes in livestock ownership are probably the most important livelihoods issue in the region today, because limited animal ownership often pushes poorer households into negative diversified activities. Although diversification can help to reduce risks, many forms of diversification currently practiced in Karamoja have harmful social or environmental consequences, or, result in very low levels of income and poverty traps (Bushby and Stites, 2016). Not only will a decline in livestock ownership have a negative impact on poverty and food security, but it will also influence many of the social institutions and networks that support livelihoods, and define Karamojong culture and leadership. At the same time, livestock markets are active and expanding in Karamoja, including a dynamic cross-border trade with Kenya (Rockeman et al., 2016; Aklilu, 2018). A further challenge is that different surveys and reports from Karamoja provide very different findings on the distribution of livestock ownership.

From a policy and programming perspective, analysis of livestock threshold in Karamoja provides a measure of the proportion of households who are pursuing a livelihood based mainly on pastoralism or agro-pastoralism, versus those who might own some animals, but who are using various strategies

to make a living. Furthermore, livestock threshold analysis can provide insights into the number or proportion of households who are caught in a poverty trap. These households have very low levels of livestock ownership and will often struggle to rebuild their herds to a sufficient level to resume a pastoralist livelihood. For example, non-livestock activities often take the form of "bad diversification" (Little, 2016) and activities such as charcoal production, firewood sales, or wage labor that provide levels of income that might contribute to household food security, but are far too low to enable livestock purchases (Iyer and Mosebu, 2017). Although poorer households with few animals might self-identify as pastoralists, from an economic perspective they need a "substantial positive shock" (McPeak and Little, 2017) to their livestock assets to function as pastoralists. With these issues in mind the study estimated the livestock threshold for agro-pastoralism in Karamoja; the proportion of households below the livestock threshold; for households below the livestock threshold, the gap in livestock assets against the threshold.

2. Design and Methods

2.1 Estimating a livestock threshold

The estimation of the livestock threshold assumed that an agro-pastoralist household in Karamoja derives food from three main sources: the direct consumption of livestock products, especially milk; the sale of livestock in exchange for cereals; and the direct consumption of own-produced cereals. Therefore, a household's capacity to meet its basic food needs depends mainly on: the size, composition, and productivity of the herd; the area of land available for crop production and crop yields; and market prices of livestock and cereals. Using these assumptions, a simple household-level model can be developed to calculate the minimum number and type of livestock that are needed for the household to be food secure. Some of the main variables and assumptions are outlined in below.

Household characteristics and food needs

- The model used a household of six people, comprising 2 adults and 4 children.[1]
- Food energy needs per person were assumed to be 2,100 kcal/day.

Livestock herd and production

- Milk in agro-pastoralist households is derived mainly from cows and goats.
- Milk production and off-take depends on the number of cows and goats of breeding age, reproductive performance, production, and herd management.
- Production losses include losses due to disease and drought.
- Information on livestock herd production in Karamoja is limited, but, reasonable information is available from comparable pastoralist systems in East Africa (see Annex 1 for literature and data used).
- The food energy value of cow and goat milk is known.

Land and crop production

- The area of land available from cropping is limited by the use of hand tools and manual labour; the model used a land area of 0.4 ha cultivated.
- For the sake of simplicity, the model used sorghum as the single crop produced by the household.
- Limited information is available on sorghum yields in Karamoja, or losses due to pests, rainfall variability and other causes; information on post-harvest losses is also limited. Sorghum yields were averaged from estimates provided by Nabuin Zonal Agricultural and Research Development Institute.
- The food energy value of sorghum is known.

Market prices

- Good information is available on the prices of livestock and cereals in Karamoja; the model used average prices for 2017.

[1] Based on census data for the six districts from the Uganda Bureau of Statistics https://www.ubos.org/wp-content/uploads/publications/03_2018Population_by_Parish_Census_2014_Northern_Region.pdf

- The model assumed that the household sold young male goats, and bulls, and retained breeding females; this approach is consistent with maximizing herd growth while also selling animals to meet domestic needs.

The listing of assumptions above shows a reliance on two main types of data, with different levels of validity. First, relatively valid information is available for variables such as human food energy needs, the energy values of foods such as milk and sorghum, and the market prices of livestock and cereals in Karamoja. These variables are either standard figures, derived from nutrition tables, or, absolute market price figures. Second, less valid information is available on herd production, livestock losses, land cultivated, and sorghum yields and losses, because there are few studies that describe these variables in Karamoja. There is also likely to be wide variation between households for these variables, and variation by year and season.

2.2 Applying the livestock threshold

To measure the proportions of households above and below the livestock threshold in Karamoja, we used raw data from a livestock demographic survey conducted in 2017 (Schloeder, 2018). This survey collected livestock ownership figures from a sample of 3,578 households across Karamoja's seven districts. From the raw dataset, we selected the six districts of Napak, Nakapiripirit, Moroto, Kaabong, Kotido and Amudat, and categorized these areas as the main livestock rearing districts. We deselected households in Abim district, as we categorized Abim as primarily an agricultural district. This selection of districts produced a sample of 2,729 households. For each household in this sample, we converted the numbers of livestock by species and household into TLU, using conversion factors of 1 cattle = 0.7 TLU, and 1 sheep or goats = 0.1 TLU (Jahnke, 1982), and then calculated TLU/capita for each household. We assumed an average household size of 6 people, derived from UBOS population data from 2014.[2]

There were three main limitations to this part of the analysis. First, the livestock demographic survey did not collect data on the ownership of donkeys, camels or poultry, and therefore, the survey underestimated total household livestock ownership. Camels are particularly important in Amudat district. Second, for the sake of simplicity and due to the exploratory nature of the analysis, we regarded Amudat district as agro-pastoralist whereas it is more pastoralist than other districts. Third, we did not probe the definition of "household" in the demographic survey, or the possibility that wealthier households would be polygamous, with more household members.

3. Results

3.1 Livestock threshold for agro-pastoralism

The simple household model produced a livestock threshold for agro-pastoralism in Karamoja of 3.3 TLU/capita, equivalent to 4.7 cattle or 33 goats per capita. Below this threshold, a household could not meet its basic food energy requirements, and would need to supplement its own- produced food (or income from livestock) from other sources. For a household of 6 people (2 adults, 4 children), and 3.3 TLU/capita, an illustrative model herd could comprise 45 goats and 22 cattle, and would produce milk to supply 18% of annual household energy requirements. Own crop production would produce sorghum to supply 23% of annual household energy requirements, and the annual food energy balance would be met through the sale of livestock, and related sorghum purchases; the herd could produce 9 male goats and 2 bulls for sale each year, with the income sufficient to buy enough sorghum to meet this requirement. In this model, the annual household balance of cash income after sorghum purchases

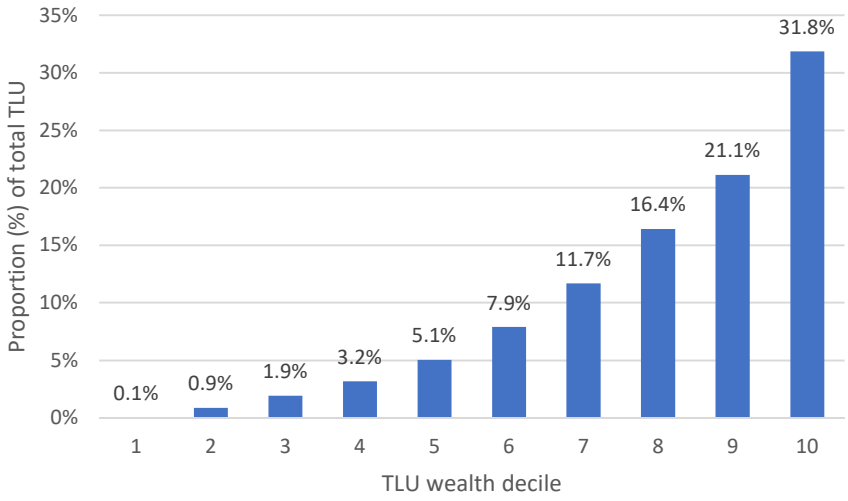
[2] https://www.ubos.org/wp-content/uploads/publications/03_2018Population_by_Parish_Census_2014_Northern_Region.pdf (accessed August 2018)

is UGX 50,257 (US$13.57) i.e. a very limited sum for other domestic expenses such as health or education, or for livestock purchases.

3.2 Distribution of livestock ownership

Figure 1 shows the pattern of livestock ownership in the six main livestock-rearing districts of Karamoja. The five lowest wealth deciles (or 50% of population) own 11.2% of livestock, whereas the wealthiest three deciles or 30% of population, own 69.3% of livestock.

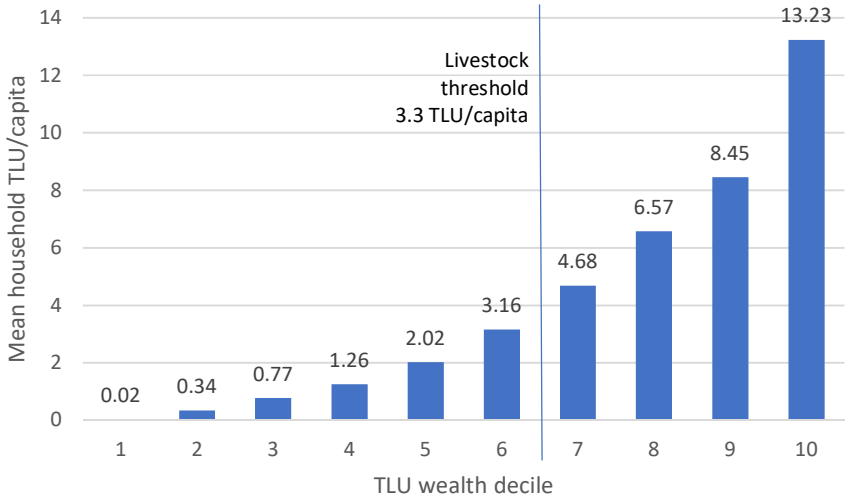
Figure 1. Total livestock ownership by wealth decile, Karamoja, 2017.



Notes: n= 2,729 households; [a] data derived from six districts – Amudat, Kaabong, Kotido, Napak, Nakapiripirit and Moroto covered by the 2017 livestock demographic survey (Schloeder, 2018).

Figure 2 shows mean TLU/capita by wealth decile, and as expected, has a similar pattern of ownership to that shown in Figure 1. Applying a livestock threshold of 3.3 TLU/capita to the graph shows that the lowest six wealth deciles, or about 60% of population, fall below the livestock threshold. An actual count of households showed that 1,542 households from the sample of 2,729 households owned less than 3.3 TLU/capita, or 56.5% of households.

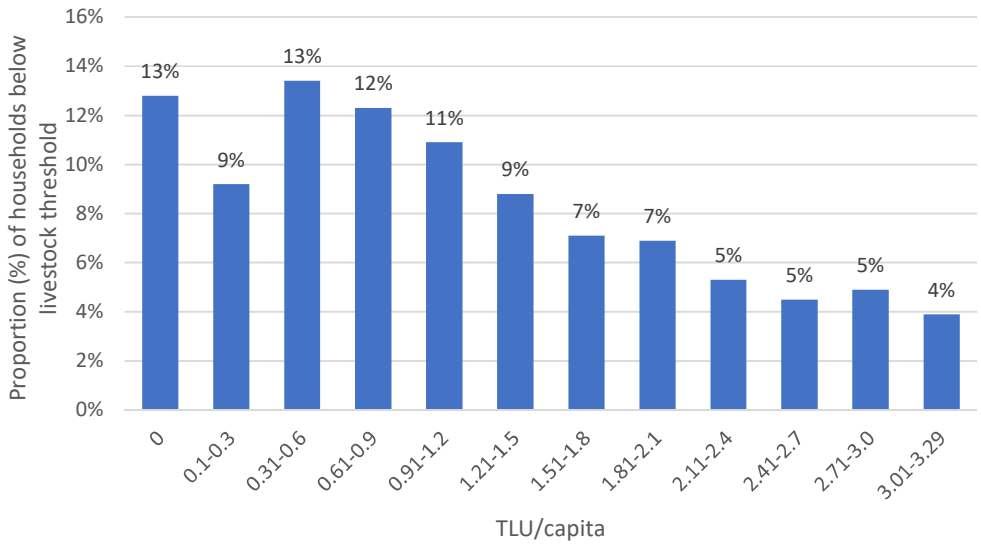
Figure 2. Livestock ownership (TLU/capita) by wealth decile, Karamoja[a], 2017



Notes: n= 2,729 households; [a] data derived from six districts – Amudat, Kaabong, Kotido, Napak, Nakapiripirit and Moroto covered by the 2017 livestock demographic survey (Schloeder, 2018).

Figure 3 looks specifically at poorer households, below the 3.3 TLU/capita threshold. The graph illustrates a skewed ownership away from the threshold, indicating a substantial asset gap for many households in terms of attaining the threshold. For example, 67% of households below the livestock threshold owned 1.5 TLU/capita or less i.e. less than half of required livestock to reach the threshold.

Figure 3. Livestock ownership in households below the livestock threshold, Karamoja, 2017



Using this data, it is also possible to estimate the total "livestock asset gap" in the six districts of Karamoja covered by the study, and against the livestock threshold. The estimate is shown in Table 1, and shows that a total of 1.04 million TLU would be needed to fill the livestock asset gap in the six districts. This is equivalent to 1.48 million cattle or 10.4 million goats.

Table 1. The livestock asset gap in Karamoja against the livestock threshold

Livestock asset gap (TLU/capita) against livestock threshold	Proportion of population affected	Number of people affected[a]	TLU required to reach livestock threshold
3.30	13%	62,195	205,244
3.10	9%	44,703	138,579
2.84	13%	65,111	184,914
2.54	12%	59,766	151,805
2.24	11%	52,963	118,637
1.94	9%	42,759	82,953
1.64	7%	34,499	56,578
1.34	7%	33,527	44,926
1.04	5%	25,753	26,783
0.74	5%	21,866	16,180
0.44	5%	23,809	10,476
0.14	4%	18,950	2,653
		485,900	1,039,729

[a]Assumes a human population of 860,000 in the six districts covered by the analysis.

4. Discussion

4.1 Data issues

4.1.1 Issues with survey data

The study used pre-existing survey data, and the survey used a questionnaire to collect data on the numbers and types of animals owned. Although this approach produces quantitative data, it can also be affected by important errors and biases. Typically, the use of questionnaires to collect livestock ownership data from pastoralists is subject to various non-sampling errors, including misinterpretation or inconsistent interpretation of the questions asked, or conscious mis-reporting of animal ownership, especially under-reporting. The risk of under-reporting is likely to be high in situations where: populations have long-term experience of development or humanitarian aid and expect aid to continue; when government policies or narratives are critical of pastoralism; or when government actions have had negative impacts on livestock survival. All three of these conditions apply to Karamoja.

Furthermore, as outlined in section 2.2 the livestock survey did not cover the ownership of camels, donkeys or poultry. Camels are particularly important in Amudat district and surrounding areas, and as a valuable livestock species, are more likely to be owned by wealthier households. For example, a recent study in Rupa sub-county in Moroto district and Loroo and Amudat sub-counties in Amudat district reported that camels were owned by 45% of households, and these households had above-average income (Salamalu et al., 2017). Camels represented 44.7% of herd composition in terms of TLU. The net effect is that the livestock ownership of wealthier households will be understated across the analysis. Donkeys are often an important livestock species kept by pastoralists, and are used for transport e.g. for moving firewood, charcoal or water; omitting donkeys from the analysis will lead to an under-estimation of TLU/capita, especially in poorer households. Poultry have a very low TLU value of only 0.01 TLU and so the ownership of small numbers of poultry will have much effect on the TLU/capita figures.

4.1.2 Estimating the livestock threshold

The livestock threshold of 3.3 TLU/capita for agro-pastoralists in Karamoja is broadly consistent with other dryland areas of Africa. For example, modelling by the World Bank suggested that, *"3-4 TLU/capita are needed for pastoralists to stay above the poverty line"* (De Hann, 2016). The livestock threshold is relatively straightforward to calculate, but the validity of the 3.3 TLU/capita figure depends heavily on the estimates for the various indicators that are used for the threshold model. As explained in section 2.1, some of these indicators are standard figures (e.g. the energy values of specific foods), others are absolute values (e.g. market prices of livestock and cereals), and others are drawn from the literature (e.g. livestock production indicators). The main source of inaccuracy in the threshold model is the latter set of indicators because basic production information is not available for livestock in Karamoja, and we used figures from other pastoralist areas of East Africa.

4.2 Livestock ownership and poverty

The livestock ownership pattern in agro-pastoralist and pastoralist areas of Karamoja is broadly similar to other pastoralist areas of East Africa where comparable data is available. For example, whereas the wealthiest 30% of the agro-pastoralist and pastoralist population in Karamoja owned 69.3% of livestock (Figure 1), in 11 different pastoralist ethnic groups in northern Kenya and southern Ethiopia, the wealthiest 30% owned 75% of livestock in terms of TLU (McPeak and Little, 2017). Similarly, in Afar and Somali regions of Ethiopia, the wealthiest 30% of households owned approximately 75.7% and 71.2% of livestock respectively Sabates-Wheeler and Lind (2013). An assessment of poverty in Marsabit District of northern Kenya included the use of a 4.5 TLU/capita

threshold to define non-poor and poor households (Mburu et al., 2017), and reported that 88.6% of households were livestock-poor. Also, a wider study on dryland livestock systems in Africa in 2016 concluded that, *"... given expected population growth of 3% per year for pastoralists and 2.5% per year for agro-pastoralists, assuming the same ownership patterns, and based on a "business as usual" scenario characterized by a continuation of current policies, 77% of pastoralists and 55% of agro-pastoralists will have less than 50 percent of the TLU per capita needed to stay above the poverty line by 2030, suggesting they will feel pressure to exit from the sector or face living indefinitely in poverty."*

Our findings indicate that although the selected pastoralists areas of Ethiopia, Kenya, and Karamoja have important ecological, economic, and social differences, patterns of livestock ownership by wealth group are similar. Therefore, although Karamoja has experienced a unique large-scale disarmament program that was associated with dramatic livestock mortality, the sub-region's livestock ownership pattern is still typical of pastoralist areas that have experienced many decades of political marginalization, and inappropriate policies and development programs, coinciding with trends such as human population growth. In northern Kenya and southern Ethiopia, it was recognized that different livelihood strategies were associated with different levels of wealth i.e. income and livestock assets, and so households were characterized as, "left out" of pastoralism, "moving from" pastoralism, "staying with" pastoralism, and "combining" pastoralism with other sources of income (McPeak et al., 2012). These pathways are similar to the Moving Up-Moving Out analysis that was used to describe the co-existence of growing livestock trade with increased humanitarian needs in pastoralist areas, and a redistribution of livestock from poorer to wealthier households (Aklilu and Catley, 2010); Catley and Aklilu, 2013). Our analysis indicates that both of these framings apply to Karamoja, but with the effect of disarmament program being to accelerate a process of livestock redistribution.

The finding that 56.5% of households in the six selected districts fell below the livestock threshold is broadly consistent with measures of food insecurity and malnutrition in Karamoja, and the income poverty. As so many households have too few animals, then insufficient access to animal milk would be expected, with direct and negative impacts on the nutrition of children and mothers in particular. Low livestock holdings also forces poorer households to rely more heavily on crop production, but in a context where yields are low e.g. due to rain failures, or small areas of cultivation. However, in contrast to FSNA reports, the analysis shows far higher levels of livestock ownership in terms of the proportion of households owning any livestock at all. Whereas recent food security and nutrition survey reports cite 45% to 46% of households without any animals (FNSA 2017; 2018), our analysis indicates that only 13% of households were without any animals.

4.3 Measuring poverty

As proposed by studies in Kenya and Ethiopia, poverty in pastoralist areas is best understood by measuring both livestock assets and income (McPeak and Little, 2017). In part, this is because the limited livestock ownership among poorer households means that they must use non-livestock sources of food income to meet their basic needs. In Karamoja, this is illustrated in our finding that 56.5% of households were below the livestock threshold. These households would be relying heavily on diversified livelihood activities such as crop production (but largely due to circumstance not choice), casual labor and having multiple "small jobs" in towns – including out migration to find work, agricultural labor, mining, the collection and sale of firewood, charcoal and other activities (Bushby and Stites, 2016). Therefore, a combination of livestock ownership and income measurement not only shows who is poor, but also largely explains *why* they are poor and the extent to which poverty traps are evident. Plus, a basic comparison of wage rates with food prices and other domestic needs such as school fees, indicates the extent to which households are able to save cash, buy assets or invest in education.

Measuring income is also relevant to wealthier households or those "Combining" with pastoralism or "Moving Up". These households will often show positive diversification, by investing in local businesses, livestock services and trade, and education.

4.4 Policy and programming implications

4.4.1 Poverty-focused livestock programming

Since the 1970s, development programs in pastoralist areas of East Africa have often recognized the importance of livestock and so have included livestock marketing, veterinary services, fodder production, rangeland management, water development and similar activities. However, there has also been general tendency to view pastoralists as universally poor, rather than consider the different aspirations and strategies of different wealth groups. Looking specifically at livestock marketing, a substantial body of literature shows that marketing behavior among pastoralists is differentiated by wealth, and that middle and high wealth groups supply most of the animals to markets; this is because they have more excess animals to sell. In contrast, poorer herders pursue a logical economic strategy of maximizing herd growth, which equates to maximizing their financial capital. During this process, they minimize livestock sales and only sell animals when they have important domestic needs (Catley, 2018). Similarly, such sales are not very price responsive and are more affected by the timing or urgency of the need. It follows that market support provides disproportionately higher benefits to richer pastoralists (Aklilu and Catley, 2010; De Haan, 2016). This is not to say that markets have no relevance for the poor; good market access (proximity) is important to enable livestock sales and food purchases by poorer households, and minimize the transaction costs associated with travel, and moving animals to distant markets.

A livestock programming approach that shifts from area-wide, generic delivery of interventions towards a more distinctive poverty-focused approach would need to recognize that the primary objective of poorer herders is often financial/herd growth (not livestock sales). Therefore, a focused approach would aim to assist this growth by maximizing production and avoiding preventable losses *specifically for poorer households*. This might involve: ensuring access to productive rangeland for poorer herders, especially dry season access; targeted livestock feed support e.g. fodder vouchers; limiting the impacts of disease on production and survival – ensuring the accessibility, availability, affordability and quality of primary veterinary services; limiting excess mortality due drought; using drought cycle management and interventions under the *Livestock Emergency Guidelines and Standards;* preventing losses due to raiding; continuing to support peace building and conflict management. There might also a role for selected restocking, or linking restocking to social protection.

4.4.2 Restocking, social protection, and other issues

The results in Table 1 shows that approximately 0.5 million people in Karamoja would need 1 million TLU to reach the livestock threshold, and thereby meet their basic food security needs. This points to a need to consider if and how restocking might be further used in Karamoja, and at what scale. A general experiences from restocking in pastoralist areas of East Africa is that it can improve food security and reduce dependency on external support (Lotira, 2004; Wekesa, 2005) – but only when well-designed and implemented; good design often means complementing, rather than replacing, traditional restocking systems. Effective restocking also depends heavily on strong community participation and flexibility; these aspects are easier to ensure in small-scale, localized approaches compared with large-scale projects. Recipients of livestock under restocking usually require additional support until herds have grown to a sufficient size to produce meaningful amounts of milk and offspring; typically, this support has been mainly in the form of food aid and veterinary care. The use of local breeds of livestock, with local purchase, works far better than using non-local breeds, imported from other areas.

Against these experiences, social protection programs in pastoralist areas of Ethiopia and Kenya have aimed to improve food security, and build and protect financial assets. Evaluations of these programs indicate some clear food security benefits, but limited or no livelihoods impact in terms of livestock assets (OPM/IDS, 2012; Kumar and Hoddinott, 2015). In part, this relates to the size of the cash transfers in these programs, and the need to maximize the number of beneficiaries against a finite program budget; this means that the size of the transfers is sufficient to contribute towards food purchases, for example, but not sufficient to enable meaningful purchase of productive financial assets such as livestock. However, the option of combining social protection with selective restocking could be considered for Karamoja – but it would need very careful design and piloting. A critical area is to understand traditional restocking practices, and the strategies used by poorer households to build herds. External support could to add value or "top-up" these systems. Further guidance is available in the relevant chapter of the *Livestock Emergency Guidelines and Standards* (LEGS, 2014). Analysis of access to rangeland would also need to be considered for growing herds, given changes in land use in Karamoja (Egeru et al., 2014).

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