

Livestock and livelihoods in South Sudan

Andy Catley

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Question

1. *How important is livestock currently to livelihoods in South Sudan?*
2. *What is the state of knowledge about livestock markets in South Sudan, their drivers, dynamics and structure? What is known about the volumes traded, how this has changed and what the causes are of any such changes?*
3. *What is estimated to be the contribution of livestock to GDP? What methodologies have other countries used to assess this contribution?*
4. *How does the grey literature on South Sudan's and other regional counties livestock sectors judge the sector may change in coming years? What might be the impact of more stable/peaceful conditions, what trends may continue in ownership patterns and, in particular, the distributional aspects of ownership?*

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1. Summary

The importance of livestock to livelihoods

In South Sudan agro-pastoralism is the main livelihood system in rural areas. Although agro-pastoralism involves both livestock rearing and crop production, a household's financial capital is held in the form of livestock. Livestock also supply milk and other foods, and are sold to purchase cereals for food and meet other domestic needs. Poorer households aim to build their herds; this is the key and economically logical strategy for building their financial capital. Due to the seasonality of food production, milk is a critical food at specific times of year, when other foods e.g. cereals, are not readily available. Milk is an especially important food for young children, and pregnant and lactating mothers. Livestock is also important in South Sudan's pastoralist and agrarian areas.

In addition to the role of livestock as financial capital and food, traditional social support systems in South Sudan are based on livestock transactions. In particular, the use of livestock as bridewealth creates social networks, with reciprocal assistance in times of hardship. An individual's vulnerability depends heavily on their social connectedness, and social connections are created and maintained through livestock exchanges. This critical role of livestock in South Sudan is difficult to quantify, but has huge significance in communities facing crises such as protracted conflict and market failures. Further information on the impact of conflict on livestock is provided in recent the K4D report *Livestock and conflict in South Sudan* (Idris, 2018).

Information on trends in livestock points to a decline in livestock among wealthier and middle-wealth households as a result of targeted raiding during the recent conflict. Consequently, affected households have shifted into a category of poor households i.e. there are now higher numbers of poor households in South Sudan, with relatively few animals. From an economic perspective, agro-pastoralism is associated with the ownership of at least three Tropical Livestock Units (TLU) per capita, equivalent to about four cattle or 30 sheep or goats per person. However, using a Food Security and Nutrition Monitoring Bulletin from May 2018 (World Food Programme, 2018), average livestock ownership in South Sudan was estimated at only to 0.87 Tropical Livestock Units per capita. This low level of livestock ownership is broadly consistent with the recent categorization of 5.4 million people in South Sudan as severely food insecure (Integrated Phase Classification³, 4 and 5). At the same time, South Sudan's oil wealth up to 2015 and conflict since 2013 seems to have created a class of "super-rich" elites with very large herds of livestock. In addition to problems such as conflict and market access, the critical livelihood issue for many households is the extent to which they can rebuild their herds or access livestock products, especially milk. For the millions of poorer herding households who still rely on livestock or with aspirations to rebuild their herds, the danger is that within aid circles, livestock is viewed as the domain of the rich, rather than the critical financial asset of the poor.

Livestock and markets

The first few years after the Comprehensive Peace Agreement (CPA) in 2005 saw a marked increase in livestock marketing activity in South Sudan associated with oil revenues, rising government employment, and a large influx of returnees. Many people were trying to rebuild their herds, and acquire livestock to pay bridewealth. However, whereas the pre-CPA period saw South Sudan exporting livestock to Uganda, this trade changed direction after the CPA and Ugandan cattle were imported, mainly to meet demands in Juba. At the same time, there was

cross-border trade between South Sudan and Sudan, with cattle exported from Upper Nile to the north. Therefore, South Sudan was both importing and exporting cattle at this time.

The outbreak of conflict in late 2013 had major impacts on livestock marketing, as large numbers of livestock were raided, especially from wealthy and middle-wealth owners with relatively large herds. The other impacts of conflict included thefts of livestock en route to markets, market closures and market destruction, and travel restrictions causing reduced market access. There were also indirect impacts of the conflict associated with reduced market supply, because conflict had major impacts on livestock movement, access to grazing and avoidance of livestock diseases, as well as the provision of veterinary services. Due to the dramatic fall in the value of the SSP, the import of livestock from Uganda ceased. However, at the same time as some market routes closed down, others opened up. For example, when Nuer traders faced blocks to trade routes to Sudan, Bor and Juba, they changed the direction of the trade and instead, moved large numbers of cattle to Ethiopia for sale.

From a livelihoods perspective, agro-pastoralists rarely produce enough cereals to meet their needs, and so rely on some livestock sales each year to acquire cash to buy cereals; for pastoralists, the need to sell livestock is even greater. Therefore, the terms of trade between livestock and cereals show the level at which herding households need to liquidate their main financial asset, i.e. livestock, at times of food shortage. In Jonglei and Upper Nile between 2013 and 2017, the goat-sorghum price ratio increased by a factor of 8 times in some areas, i.e. eight times more goats were needed to be sold to acquire the same amount of sorghum. In Lakes, up to 10 times more goats needed to be sold in 2017 to buy the same amount of sorghum acquired with one goat in 2013. The impact on livestock markets is that suppliers become increasingly reluctant to sell animals, and market activity becomes further deflated.

Various agencies collect livestock market information in South Sudan, but an important gap is information on cross-border livestock trade, which is more difficult to measure.

The contribution of livestock to Gross Domestic Product

The method for calculating livestock gross domestic product (GDP) is the production approach, whereby the value of production is estimated by applying production coefficients by species and product to livestock population data, assigning a monetary value to the products using price surveys, and then deducting input costs. Typically, countries in East Africa focus on meat and milk production, and according to international standards for GDP accounting, do not consider processed products. From 2009, the Intergovernmental Authority on Development (IGAD) commissioned a series of country studies and developed a more comprehensive approach for measuring livestock GDP, which took account of a wider range of products as well as livestock-derived savings and financial services. This led to estimates of livestock GDP for Ethiopia, Kenya, Sudan (north and south) and Uganda that were far higher than official estimates.

Unfortunately, livestock population data for South Sudan (and Sudan) is very unreliable and as this data is basis for the GDP calculation, the GDP estimate is also unreliable. In addition, very limited information is available on livestock productive performance in South Sudan. These concerns have been raised repeatedly in studies on livestock GDP for South Sudan (and Sudan).

The most recent official estimate of livestock GDP for South Sudan is US\$1.7 billion, but this estimate includes forestry and fisheries. However, using the production method used by the IGAD country studies mentioned above, livestock GDP was later calculated by an IGAD study at US\$3.0 billion.

Future directions

Agro-pastoralist and pastoralist producers in Ethiopia, Kenya, Somalia, Sudan and Uganda are major suppliers of livestock to formal and informal domestic, regional and international markets, and in general, have responded to market opportunities. Livestock trade routes are dynamic and often change, with animals moving towards areas with high prices. As market access and human populations have grown in a context of declining access to rangeland, socio-economic differentiation has become increasingly evident in many pastoralist areas, with a skewed ownership of livestock towards wealthier producers. Most of the livestock supplied to markets is by wealthier and middle-wealth producers, who consequently, capture most of the benefit of the market-based economic growth. Poorer producers aim to build their financial capital in the form of livestock, and so minimise sales, but many of them struggle to stay in the system and are forced to pursue more diversified livelihoods. This pathway often leads to poverty traps. One response from governments and aid donors has been large-scale social protection programmes, in Kenya, Ethiopia and Uganda.

In a future, peaceful South Sudan it seems likely that a comparable pattern of market orientation will occur, including more domestic livestock trade as human populations and urban centres grow, and more cross-border trade. This trend will provide economic benefits to those livestock producers who stay in the system, and mobile herding will continue with large herds, sometime cared for by contract herders. However, if South Sudan follows a similar livestock trajectory to other countries, many people will exist on the edge of agro-pastoralism and pastoralism, and mixes of livestock and diversified activities. If so, the main development challenge is to support livestock-based livelihoods where feasible, as well as diversified and alternative livelihoods.

2. The importance of livestock to livelihoods

Livestock for wealth, food and income

Livestock has featured prominently in food security assessments in South Sudan since Operation Lifeline Sudan (Southern Sector) introduced the food economy approach in 1994 (World Food Programme, 1996). Although qualitative in nature, the methodology was repeated by WFP and Save the Children over the following 12 years and covered all of South Sudan's livelihood zones (Fielding et al., 2000; Muchomba and Sharp, 2006). Consistently, these reports explained how livestock was central to livelihoods in much of South Sudan, including estimates of contributions of milk and meat to diets, the importance of livestock sales to acquire cash (e.g. for purchases of cereals), and the role of livestock as social capital (especially for bridewealth). The importance of livestock was also reflected in local definitions of wealth, that often focussed on livestock ownership and area of land cultivated. Essentially, South Sudan's cattle camps, where herds congregate, were places of food security because of the access to cow milk.

As recently as August 2018, livelihood profiles for South Sudan are comparable to those in the pre-CPA period and show the importance of livestock in all 12 livelihoods zones, but with levels of importance depending on whether the zone is primarily agro-pastoralist, pastoralist or agrarian (FEWSNET, 2018).

In essence, South Sudan's environment and climate means that agro-pastoralism is the main livelihood system in the vast western and eastern flood plains, stretching from Northern Bahr el Ghazal across Warrap, Unity, Lakes and Jonglei. Agro-pastoralism also dominates Upper Nile.

Although agro-pastoralism involves both livestock herding and crop production, the household's financial capital is held primarily in the form of livestock, and traditional social support systems and kinship ties are based on livestock transactions. Social capital is central to understanding vulnerability in South Sudan. Livestock assets are also the basis for pastoralist livelihoods in the semi-arid south east of the country, and are important sources of food, income and financial capital in almost all agricultural areas. Unfortunately, although livestock also continues to feature heavily in local definitions of wealth and poverty, the most recent livelihood zoning lists livestock species to wealth groups in each zone but omits details on the number of animals owned (FEWSNET, 2018). For agro-pastoralist and pastoralist households, this information is central to understanding livelihoods, as indicated in localised field research and assessments in 2015 (Table 1) and 2018 (Table 2).

Table 1. Livestock and local definitions of wealth, Greater Upper Nile (source: Short, 2015)

Wealth groups in Nasir (Jikmir Payam/ Nuer)	Wealth groups in Maban (Bouta Danji/ Mabanese)	Wealth groups in Renk (Renk Payam/ Dinka)
'Riang rian' (Rich) – 15% More than 50 cow & 100 small ruminants; perceived as declining due to raiding over past 10 years	'Minachiegan' – 24% The rich man – plus big farms Some with more than 100 cattle & large farms	Cochei Kueth – 20% Rich More than 50 cattle + 200 – 300 sheep & goats and large farms
Riang (Better off) – 44% 25 – 40 cows & 50 – 60 small ruminants Seen as generally increasing herd sizes	'Minamalandieran' –9% The middle or medium Up to 10 – 20 cattle	Middle de Kang – 35% Not rich nor poor 40 – 100 cattle; up to 200 sheep & goats
'Chan' (Poor) – 26% 2 cows & few SRs	'Minabalkolnidekken' – 10% Poor person with 2 – 5 cattle	Poor – 45% No animals Some due to threat of theft & inability to hire herder
'Chaninchar' (extreme poor) – 14% No animals	'Minabowan' The extreme poor man – 57% No animals	

Table 2. Livestock and local definitions of wealth, Twic County, 2018 (source: Short, 2018)

Wealth group characteristics	Proportion of women	Proportion of men
Ajak 'better off': 50 – 100 cows; 4 – 7 feddan farms; 100 – 200 goats; children in school; hire tractor; employed with car, motorcycle, traders 5 – 10 wives (10 – 20 children)/ 5 – 6 houses	15%	10%
Raanpel Nyin 'a bit better' / Ajak-kor: 10 – 20 cows; 5 – 10 goats; food to eat; tukuls with places to stay; 3 – 4 wives (5 – 9 children)/ 3 – 4 houses	10%	25-30%
Laang 'poor but eat' Angang 'poor' Migrate to Khartoum; manual labour; work for themselves (only around homestead); fish & charcoal; 2 – 3 goats; 1 cow & chicken; 1 wife (2 – 3 children)/ 1 – 2 houses	25%	30%
Ayuar 'extreme poor' Not even chickens; Labour for groups 1 – 3; work on others' farms; reliant on relatives; wild fruit & foods; charcoal; firewood; collect water daily for 2 – 3 families; 'hand to mouth'; many women-headed households (lost husbands/ abandoned/ husbands away in army); 0 – 1 wife/ 0 – 1 house	50%	25-30%

Similarly, unlike the earlier livelihood profiles up to 2006 (Sharp and Muchomba, 2006), the recent livelihood zoning provides narrative descriptions of food and income sources, but without figures. To illustrate the role of livestock, figures from the earlier livelihood profiles are summarised in Table 3 for the agro-pastoralist and pastoralist areas of South Sudan.

Table 3. Annual livestock contributions to dietary energy and income (adapted from Muchomba and Sharp, 2006)

Livelihood zone	Livestock role	Wealth groups		
		Poor	Middle	Better-off
Western flood plains: agro-pastoralist	Milk (and meat) contribution to dietary energy	5%	18%	30%
	Livestock sales as source of total income	0%	33%	53%
Eastern flood plains: agro-pastoralist	Milk (and meat) contribution to dietary energy	10%	20%	30%
	Livestock sales as source of total income	16%	44%	54%
Nile and Sobat river basin: agro-pastoralist	Milk (and meat) contribution to dietary energy	5%	15%	18%
	Livestock sales as source of total income	0%	49%	56%
Hills and mountains zone: agro-pastoralist	Milk (and meat) contribution to dietary energy	10%	10%	15%
	Livestock sales as source of total income	31%	54%	64%
Arid zone: pastoralist	Milk (and meat) contribution to dietary energy	30%	30%	30%
	Livestock sales as source of total income	55%	85%	87%

Although Table 3 provides some insight into the contribution of livestock products to people's food intake, the bulk of the consumption is cow and goat milk, and this milk has benefits that are not fully captured in the livelihood reports. First, livestock milk is fed preferentially to young children, especially when in short supply, and acts as an important source of protein, vitamin A and calcium. For example, for a two-year old child the consumption of only 400ml of goat milk per day (equivalent to one medium-sized cup) provides 56% of daily protein requirement, 66% of vitamin A requirement and 117% of daily calcium requirement, according to standard Recommended Dietary Allowances (Catley, 1999).

Second, an important aspect of livelihoods in South Sudan is marked seasonal variation in livestock and crop production systems, and this is why food economy assessments have included seasonal calendars of food production and use since 1994 and through to 2018. A typical year for Dinka and Nuer agro-pastoralists includes a 'hunger gap' period which affects people from around June to August each year (Muchomba and Sharp, 2006). During this period, crops such as maize or sorghum are not yet fully ripe for harvesting and the previous year's grain supply may have been consumed. The capacity of a household to cope during the hunger gap depends heavily on milk production towards the end of the dry season and into the early wet season. Although people may be able to buy grain during the hunger gap to meet their basic food needs, their purchasing power also depends heavily on livestock ownership. Therefore, the contribution of livestock to diets and food security is not only a matter of an annual contribution relative to other types of food, but the availability of livestock-derived foods at specific times of year. For poorer households with few or no livestock, their access to livestock milk and other foods partly depends on their social networks and connectedness, which in turn, depends on livestock transfer during events such as marriage.

Financial capital, herd growth and social capital

A common misunderstanding around agro-pastoralism and pastoralism in South Sudan (and many other countries) is the view that herd accumulation is irrational and driven by prestige or culture. This is reflected in literature since the CPA in 2005 as more attention was given to livestock marketing and value chain studies. For example, when discussing constraints to livestock commercialization, Musinga et al. (2010), described livestock production as "largely socially-orientated" and bemoaned the use of livestock for bridewealth. In contrast, a substantial body of literature on the economics of pastoralism in East Africa explains the logic of large herds. This logic includes the higher economic growth of livestock herds relative to cash savings, and the management of the herd like an investment portfolio where high value and high performing

assets are only liquidated when necessary. A large herd is also a critical for risk management, because in most contexts, larger herds survive events such as droughts or disease outbreaks better than small herds, i.e. there is a higher chance of some animals surviving to enable herd recovery. Similarly, many pastoralist groups use complex systems of social support that involve loans, gifts and other exchanges of livestock, and the notion of reciprocal support. In South Sudan, these social aspects of livestock – especially the payment of bridewealth – are central to maintaining and developing social connectedness and reducing vulnerability. These issues were described for the Bor Dinka in South Sudan 20 years ago (Harragin and Chol, 1998), and more recently for Nuer pastoralists in Upper Nile (Vistas, 2015). In the humanitarian aid sector in general, social networks are increasingly being recognized as a critical aspect of surviving disasters and famine (e.g. Maxwell et al., 2015).

Livestock population

In terms of official statistics, the Ministry of Animal Resources and Fisheries (MARF) uses FAO's 2009 estimates of livestock population in South Sudan at 11.7 million cattle and 24.3 million sheep and goats (Onyanga et al., 2015). However, there is considerable discussion in the literature about the validity of these figures, and for good reason. As noted by Behnke and Osman (2012), a livestock census that involved an actual count of livestock was last conducted in Sudan (north and south) in 1975-1977; this was an aerial survey. Since then, livestock population estimates have been based on a constant rate herd growth model, and incremental annual increases in population. However, unlike human populations, national livestock populations tend not to grow exponentially because for example, livestock are managed by their owners in terms of reproductive performance and off-take, and are subject to environmental, climatic and disease-related constraints.

Not well reported in the literature are the actual figures from the 1977 survey, but for South Sudan, the survey recorded a cattle population of 5.6 million (Jones, 2001). Drawing on this estimate and the prolonged field engagement of veterinarians and other livestock professionals working for the Operation Lifeline Sudan Livestock Programme from 1989 to 2000, Jones (2001) re-estimated the cattle population at 6.8 to 7.8 million, including areas of South Sudan held by the Government of Sudan at the time. Overall, the MARF 2009 cattle population figure is implausible if compared to either the 1977 survey results, or the 2001 estimate. Not only is the herd growth model badly flawed, but the growth of the national herd would have been severely constrained by low reproductive performance and disease-related livestock losses between 1977 and 2009, and major conflict-related losses up to 2005 and again from late 2013. As discussed in section 4, this uncertainty over livestock population is important because population estimates form the basis for national calculations of livestock's economic importance.

Livestock ownership trends and livestock thresholds

From a livelihoods perspective, an understanding of livestock ownership by wealth group and how this changes over time is often more useful than total livestock population estimates, especially in agro-pastoralist and pastoralist areas. In these areas, poorer households with few or no livestock are generally considered to more at risk of food insecurity and from an economic perspective, need at least 3 to 4.5 Tropical Livestock Units (TLU)/capita, depending on their level of market engagement. Agro-pastoralist households that fall below this threshold need to engage far more in crop production, diversified non-livestock activities, or rely on family or external support.

A 2016 study by FAO examined the impacts of conflict on livestock and concluded that wealthy and medium wealth households had been most affected by raiding, and many had fallen into a poor wealth group category owning between 10 (median) and 25 (mean) cattle, and 5 (median) and 19 (mean) sheep and goats (Gebreyes et al., 2016). This pattern of raiding was explained by those households finding it more difficult to move or hide their herds relative to poorer households, with few animals (e.g. see Table 1 and 2). Assuming an average household size of 6.2 people in South Sudan (World Bank, 2015), the FAO study points to average ownership of 1.2 to 3.1 TLU/capita for poor households in the study areas, indicating that many households were below the livestock threshold of 3-4.5 TLU/capita needed for viable agro-pastoralism or pastoralism.

The most recent food security monitoring report for South Sudan recognizes the relevance of livestock ownership and includes an average figure of 5.4 TLU/household across South Sudan (WFP 2018), equivalent to 0.87 TLU/capita. This figure is substantially below the livestock threshold, and is broadly consistent with the recent categorization of 5.4 million people in South Sudan as severely food insecure (IPC 3, 4 and 5). The same document reports that between 32% to 74% of households own livestock. However, levels of ownership varied widely between the main agro-pastoralist zones, e.g. from 10.4 TLU/household (~1.68 TLU/capita) in Warrap to only 2.1 TLU/household (~0.34 TLU/capita) in Upper Nile. Although the report does not explain these differences, they could be associated with either livestock re-distribution due to conflict, or the methodological challenge of collecting accurate data on livestock from their owners. Alarming, even in Warrap with 1.68 TLU/capita, average levels of livestock ownership were still far lower than threshold needed for viable agro-pastoralism.

In late 2018, the general trend of livestock ownership in South Sudan seems to be a shift of relatively wealthy and middle-wealth owners and traders towards poverty due to livestock losses, i.e. more households with fewer animals. At the same time, a class of “super-rich” elites has emerged with massive livestock herds, acquired through oil wealth and livestock purchases (up to late 2013), and then, large-scale commercial and politically-driven raiding. Not surprisingly, the literature does not specify the number of people falling into the super-rich category, the numbers of animals they own, or how these herds are managed. For the millions of poorer herding households who still rely on livestock or with aspirations to rebuild their herds, the danger is that within aid circles, livestock is viewed as the domain of the rich, rather than the critical financial asset of the poor.

In many countries in the region, accurate statistics on livestock populations in pastoralist and agro-pastoralist areas are difficult to find, and quantitative food security surveys use data collection methods that are often unreliable in terms of livestock ownership. These challenges are evident in relatively stable and secure countries, so it is not surprising that South Sudan’s livestock statistics are subject to debate – and are likely to remain so for many years. In terms of describing the roles of livestock in livelihoods in South Sudan, far more convincing is the substantial body of qualitative literature on livelihood systems in South Sudan, comprising both economic and social perspectives, and including anthropological studies, multi-disciplinary analyses, conflict studies field assessments, and food economy-type approaches, which to varying degrees, contain quantitative or semi-quantitative information supported by descriptions of context.

3. Livestock and markets

Livestock marketing pre-CPA

The sale of livestock for cash has taken place in South Sudan since monetisation and employment, and changing attitudes concerning the exchange of cattle for money are well described in the literature (e.g. Hutchinson, 1996). Although pastoralists and agro-pastoralists are widely perceived as market averse, experiences in South Sudan up to 2013 match a general trend among herders in the Horn of Africa towards greater use of markets and diversification of livelihood strategies.

Livestock auctions have been a feature of South Sudan market towns since before Sudan's independence in 1956 (Catley et al., 2008). As conflict and insecurity cut off the supply of goods and services for purchase in the 1980s, these auctions were curtailed. However, from the mid-1990s the supply of goods and services gradually increased again, partly because NGOs started to bring in commodities such as soap and salt to pay their workers, and these items often ended up in markets. As border and road access improved, second-hand clothes and consumables found ready markets. From 1994 the animal health programme of OLS introduced payment for services and so livestock keepers had to acquire cash to pay for veterinary care. This usually meant selling animals, and local markets in some areas began to grow. Marketing activities gradually gained momentum and increased rapidly in 1998 and 1999. Livestock traders taking cattle out of South Sudan found few border controls and they returned with trade goods for sale and purchased more cattle from the proceeds. A major livestock trade route was for cattle to be walked from Bahr el Ghazal and Lakes to northern Uganda (35-40 days) and then trucked to slaughter. A smaller route existed whereby animals were walked from Toposa areas of Eastern Equatoria to Narus and then trucked through Lokichokio in Kenya to Nairobi for slaughter. Small numbers of animals would also be walked northwards to Kordofan and Darfur from Bahr El Ghazal, and to Malakal and Ethiopia from the Sobat Basin. In the late 1990s, it was estimated that 24,000 cattle were exported from South Sudan to Uganda (King and Mukasa-Mugerwa, 2002).

Livestock marketing post-CPA

After the CPA in 2005 there was a general opening up of livestock markets and increase in market activity both domestically and cross-border. At the same time, aid organizations and MARF conducted livestock market and value chain assessments, which included information on market structures, prices and volumes of sales, and demands and marketing behaviours (e.g. Steglich 2009; Musinga et al., 2010). In the years after the CPA, marked increases in prices and demands for livestock were associated with oil wealth, higher levels of government employment and salaries, large number of returnees, and those with cash aiming to buy animals to restock or pay bridewealth. Road improvements also helped livestock trade. This period also saw a reversal of the livestock export to Uganda and instead, imports of cattle from Uganda and destined for Juba. However, in the north of South Sudan, an active trade in cattle from Unity State to Sudan resumed after the CPA (Vistas, 2015). In other words, South Sudan was both importing and exporting cattle in the post CPA period. This indicates that the dynamics of livestock trade in South Sudan were complex, and comparable to other countries in the region that both imported and exported livestock e.g. Kenya and Sudan.

Livestock marketing in the current crisis, from 2014

The most recent detailed account of livestock marketing in South Sudan is included in the FAO livestock and conflict study (Gebreyes et al., 2016). The report includes information on prices and volumes of livestock traded in various markets and the cross-border trade before and after the start of conflict in December 2013, and draws on the author's own research in eight States, as well as localized accounts of market conditions in Leer County (Unity) (Ward and Ali, 2015) and Greater Upper Nile (Vistas, 2015). The outbreak of conflict in late 2013 had major impacts on livestock marketing, as large numbers of livestock were raided, especially from wealthy and middle-wealth owners with relatively large herds (Gebreyes et al., 2016). Although not reported in the literature, this aspect of raiding would have probably had a disproportionate impact on markets, because wealthier herders are the main supplier of livestock to markets during normal periods. The other impacts of conflict included thefts of livestock en route to markets, market closures and market destruction, and travel restrictions causing reduced market access. However, there were also indirect impacts associated with market supply, because conflict had major impacts on livestock movement, access to grazing and avoidance of livestock diseases, as well as the provision of veterinary services. However, at the same time, as some market routes closed down, others opened up. For example, when Nuer traders faced blocks to trade routes to Sudan, Bor and Juba, they changed the direction of the trade and instead, moved large numbers of cattle to Ethiopia for sale (Vistas, 2015).

In late 2015 and early 2016, the sharp reduction in oil production led to a national economic crisis, hyperinflation, depreciation of the SSP, and dramatic increases in food prices. The import of cattle from Uganda ceased, as importers struggled to source foreign currency, but the export of cattle from the north of South Sudan to Sudan continued in some areas but not others. Internally, the price of cereals has increased at a far higher rate than the price of livestock, with impacts on both livelihoods and markets. From a livelihoods perspective, agro-pastoralists rarely produce enough cereals to meet their needs, and so rely on some livestock sales each year to acquire cash to buy cereals; for pastoralists, the need to sell livestock is even greater. Therefore, the terms of trade between livestock and cereals show the level at which herding households need to liquidate their main financial asset, i.e. livestock, at times of food shortage. In Jonglei and Upper Nile between 2013 and 2017, the goat-sorghum price ratio increased by a factor of eight times in some areas, i.e. eight times more goats were needed to be sold to acquire the same amount of sorghum (VSF Suisse and VSF Germany 2017a). In Lakes, up 10 times more goats needed to be sold in 2017 to buy the same amount of sorghum acquired with one goat in 2013 (VSF Suisse and VSF Germany, 2017b). The impact on livestock markets is that suppliers become increasingly reluctant to sell animals, and market activity becomes deflated.

The importance of monitoring livestock and other markets is widely recognized by aid organisations. Market monitoring includes work by WFP by VSF Germany and VSF Suisse, and by FAO under its new cross-border project with IGAD, with the latter tracking market activity with Ethiopia, Kenya, Sudan and Uganda. However, it seems that this monitoring will focus mainly on established markets, whereas a substantial informal livestock trade also takes place and is more difficult to measure. This informal trade might include large-scale livestock trade by very wealthy owners with the capacity to move animals on foot or by truck directly to buyers in Sudan, for example, and bypassing normal market routes. Looking at livestock markets over time, the general picture is highly dynamic with trade routes often changing according to demands and prices, conflict-related barriers, tax avoidance, or ethnic or other relationships of trust and experience.

4. The contribution of livestock to GDP

Methods for calculating livestock GDP

In general, countries estimate the contribution of livestock to GDP by following internationally-recognized standards as described in the *System of National Accounts 1993* (United Nations, 1993), and which defines GDP as a measure of production (not a measure of welfare). Typically, the livestock contribution is reported as a contribution to agricultural GDP, because livestock is usually seen as a sub-sector of the agriculture sector. Calculations of GDP can use one of three methods: a production approach, based on the outputs of economic activity; an expenditure approach, that assumes that all production is purchased; and an income approach, that assumes that producer's income is the same as the value of their products (Behnke, 2010). IGAD Member States use the production approach for measuring GDP, and in the case of livestock this involves four main stages: first, the estimation of livestock population by species; second, the estimation of production by combining production coefficients with population figures for products such as meat, milk, eggs, etc.; third, using price data for the products to estimate the total monetary value of the products; fourth, an estimation of input costs followed by the deduction of these costs from the gross output value. The livestock GDP calculation focuses on unprocessed or lightly processed products.

Improved livestock GDP estimates: the IGAD studies

In 2009 the IGAD-FAO Livestock Policy Initiative project aimed to raise the profile of livestock in Members States and one approach was to revisit the various national livestock GDP calculations. It became apparent that the economic value of livestock was usually under-estimated by governments, because the methods used overlooked important livestock products and uses. IGAD then commissioned a series of national studies to re-calculate livestock GDP, leading to reports for Ethiopia (Behnke, 2010), Kenya (Behnke and Muthami, 2011), Sudan (Behnke and Osman, 2012) and Uganda (Behnke and Nakiryia, 2012). The GDP calculation method in these studies used, to varying degrees, updated livestock population projections, a revised and expanded list of livestock products, and inclusion of the value of livestock as a form of draught power, savings, insurance and other uses. This process led to livestock GDP estimates that were between 47% (Ethiopia) and 150% (Kenya) higher than previous official figures. However, it was not clear if governments then adopted the findings of these studies, and officially reported the new livestock GDP figures.

The IGAD livestock GDP study for Sudan covered both Sudan and South Sudan, and throughout the study report the authors express concerns about the limitations of the MARF 2009 livestock population figures for the two countries (Behnke and Osman, 2012). This was seen as a major source of error, not least because the entire GDP calculation has to be based on the population estimates. In addition, the authors noted that the price data was limited to Sudan, with no price data available for the south. The combined livestock GDP figure for both countries was US\$14.5 billion. In the report, the livestock GDP for South Sudan was not reported separately.

South Sudan livestock GDP

Since 2012 there have been at least two livestock GDP estimates calculations dealing specifically with South Sudan. According to Onyango et al. (2015), the first estimate was produced by the unified Sudan government and then adopted by the National Bureau of

Statistics in the new South Sudan in 2013. This estimate of livestock GDP was US\$1.7 billion, but the estimate included forestry and fisheries. The method used for the calculation is unclear, as Onyango et al. (2015) describe the method as both a “commodity approach” and an expenditure approach. However, using the production method used by the IGAD country studies mentioned above (with four main stages), livestock GDP was later calculated by another IGAD study dealing specifically with South Sudan in 2015 (Onyango et al., 2015). This study reported a livestock GDP of US\$3 billion. In terms of livestock production and uses, the IGAD study covered the following categories:

- Milk from cattle, camels, sheep and goats
- Off-take from cattle, camels, sheep and goats, representing live animals for sale
- Hides and skins from cattle, camels, sheep and goats
- Manure for fertilizer
- Draught power
- Livestock financial services, being livestock for credit and for self-insurance.

The study also considered the value of home-consumed livestock products, and the export of live animals, hides, skins and leather products. In common with the earlier IGAD study for Sudan (north and south) (Behnke and Osman, 2012), the IGAD South Sudan livestock GDP study discusses the limitations of the calculation, including concerns over the validity of the livestock population data, the limited research to guide the production coefficients, and the limited data on South Sudan’s informal cross-border livestock trade (Onyango et al., 2015). The 2015 IGAD South Sudan study used the same livestock population figures as the 2012 IGAD Sudan study.

Regarding production coefficients, there seems to have been limited or no research on livestock production in South Sudan since the livestock studies conducted as part of the feasibility assessment for developing the Jonglei canal in the early 1980s (Mefit-Babtie, 1983). These studies covered basic production variables for Dinka, Nuer and Shilluk cattle, sheep and goats. In contrast, there is far more published and grey literature on livestock disease in South Sudan but this literature has limited value for GDP calculations.

In terms of the contribution of livestock to national, total GDP in South Sudan, the proportional contribution has probably varied considerably, depending heavily on the performance of oil exports in a given year. As oil production and exports fall, the proportional contribution of livestock to national GDP will increase. Using the National Bureau of Statistics livestock (plus forestry and fisheries) GDP estimate of US\$1.7 billion for 2013 against the national GDP of US\$ 13.26 billion¹, the proportional contribution of livestock (plus forestry and fisheries) was 12.8%. However, the 2015 the IGAD livestock GDP estimate was US\$3 billion against a national GDP for that year of US\$9.02 billion i.e. the proportional contribution of livestock was 33% - but the methods for calculating livestock and national GDP in this example were different, and the livestock GDP used livestock population figures and production coefficients that were little more than guesswork. Plus, GDP trends have to viewed against other trends such as inflation and currency values.

¹ <https://www.worldatlas.com/finance/south-sudan/gdp.html>

Despite the difficulties in calculating livestock GDP, it is evident that South Sudan has a substantial livestock population, that milk is an important part of the diet for rural people, especially children, that livestock sales are important source of income, there is a dynamic cross-border livestock trade, and that livestock are central to social cohesion and connectedness, which in turn, is the basis for support from relatives and kinfolk during crises. Although it is difficult to describe these benefits of livestock in quantitative terms, other East African countries with a relatively stable governance and security environment since independence also have highly unreliable statistics on livestock.

5. Future directions for livestock

South Sudan's livestock sector is based primarily on agro-pastoralism, and to a lesser extent, pastoralism. Therefore, this section focuses on changes to these systems in other countries in the region and the implications for South Sudan.

Trends in pastoralism and agro-pastoralism in East Africa

Although agro-pastoralist and pastoralist producers are often perceived as market averse, these producers are major suppliers of livestock to domestic and export markets. For example, livestock from pastoralist areas dominate Ethiopia's substantial formal export and domestic trade; Somalia's large livestock export trade is based on pastoralism (Aklilu and Catley, 2010); and Sudan's pastoralists are major suppliers of domestic and export markets (Behnke, 2011). Kenya is net importer of livestock, but these imports are mainly from pastoralist producers in northern Tanzania and southern Somalia; Kenya's pastoralists supply mainly domestic markets (Aklilu and Catley, 2010). In Karamoja, an active livestock marketing system has emerged since the end of the government disarmament program in 2012, and agro-pastoralist and pastoralists now supply markets in Uganda, and to a lesser extent, Kenya (Aklilu, 2017). Livestock trade in pastoralist areas also has a major cross-border dimension that is often informal and not considered in official statistics. Important cross-border flows include cattle, camels, sheep and goats from the Somali Region of Ethiopia to the northern Somali ports and Djibouti, cattle from southern Somalia and southern Ethiopia into Kenya, and camels from northern Kenya and southern Ethiopia through Ethiopia to Sudan.

This dynamic regional trade shows that pastoralists respond to market opportunities, including changing the species composition of their herds according to market demands, and adapting trade routes to bypass barriers such as conflict, disease bans and excessive taxation. In terms of area-wide economic growth, the trends in pastoralist livestock trade are promising. However, relative to national averages, pastoralist areas continue to have high levels of poverty, food insecurity and child malnutrition, with levels of global acute malnutrition often exceeding 10%. The overall picture is that while some pastoralists are doing well and supplying markets, others are struggling to stay in the pastoralism system, and are falling out; there is often a co-existence of economic growth and increasing destitution (Catley et al., 2016). This trend is not new, and for example, was reported in the 1980s in southern Ethiopia (Coppock, 1994), northern Kenya (Hogg, 1986) and central Somalia (Abdullahi, 1993).

More recent research in East Africa shows that while pastoralist systems have often been associated with wealth inequalities, livestock ownership is becoming increased skewed towards a relatively small number of wealthier producers, including absentee owners. For example: the wealthiest 30% of the agro-pastoralist and pastoralist population in Karamoja, Uganda owned

69% of the livestock (Catley and Ayele, 2018); 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); in Afar and Somali regions of Ethiopia, the wealthiest 30% of households owned approximately 76% and 71% 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, and reported that 88.6% of households were livestock-poor and, *“The majority of households (over 70%) are both income and livestock-poor with few having escaped poverty within the five-year study period”* (Mburu et al., 2017). 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”* (de Haan, 2016). A further dimension of economic and demographic changes in pastoralist areas is some decline in traditional social support systems, as wealthier and commercially-orientated livestock owners adopt more individualistic behaviour, or simply become overwhelmed by requests from relatives for support.

Today, the majority of pastoralists in East Africa appear to be living on the edge of pastoralism in economic terms, surviving off small numbers of animals, and increasingly reliant on a range of diversified activities. Whether located in rural areas or near to towns, for these households the pathway towards wealth, food security and better nutrition is uncertain. A full return to pastoralism can be difficult as land becomes more fragmented and privately controlled, especially by political elites and wealthy pastoralists, and when drought can easily decimate small herds. Livelihoods diversification often involves low-paid or exploitative wage labour, or activities with negative environmental or social consequences (Little, 2016). The net results are poverty traps. Although often viewed by policy makers as the best alternative to pastoralism, agriculture can be far more risky than livestock production in areas with highly variable rainfall, and few permanent water sources. Commercialisation of pastoralism brings new jobs, such as contract herding or market employment, but in general, there is a marked disparity between the slow growth in work opportunities, and the substantial numbers of people who need to find work.

For women and girls in poorer pastoralist households, the situation is particularly dire, with consistently lower levels of education and health relative to men and boys, and higher risks of negative diversification, and exposure to violence and sexual abuse. Again, although livestock commercialisation provides some opportunities, such as trading in small ruminants and milk processing, women have far fewer positive economic options relative to men.

The emergence of large-scale social protection programmes in pastoralist areas of Ethiopia and Kenya is symptomatic of the problems (Catley et al., 2016). These involve regular cash transfers to vulnerable households, with international aid donors covering most of the costs. In Uganda’s Karamoja region a consortium of agencies have implemented labour-intensive public works programmes since the early 2000s. This is in addition to regular cash transfers for approximately 15% of Karamoja households through the Ugandan government’s Social Assistance Grants for Empowerment programme. In Kenya the Hunger Safety Net Programme covers Mandera, Marsabit, Turkana and Wajir counties; approximately 94% of the population are registered and at least 25% receive regular cash transfers. In Ethiopia, the Productive Safety Net Programme includes the pastoralist Afar and Somali Regions, and pastoralist areas of Oromia Region, and

aimed to cover over 2.5 million people in these areas between 2008 and 2012 with regular transfers.

Implications for livestock development in South Sudan

To some extent, some of the livelihood trends that are evident in pastoralist and agro-pastoralist areas of other countries are also seen in South Sudan. Notably, the most recent conflict in South Sudan since 2013 seems to have contributed to a high proportion of herding households owning too few livestock to function economically as agro-pastoralists, while at the same time, a class of super-rich livestock owners has emerged. In the event of a more peaceful and stable environment in South Sudan, it also seems likely that pathways towards prosperity for agro-pastoralists and pastoralists will be broadly similar to other countries in the region. On the one hand, in a peaceful situation one could imagine a re-opening of livestock markets and over time, urban growth and a growing middle class creating more domestic demands for meat and milk. Some livestock producers will respond to these demands, but typically, this will be relatively wealthier producers with larger herds. In contrast, poorer households will be aiming to build herds (financial capital) and will limit livestock sales during the period of herd growth. It is also likely that cross-border livestock trade will become more active, and again, wealthier producers will supply most of the animals for this trade. As human populations grow, poorer herding households will likely face increasing pressures, such as declining access to land, especially important dry season grazing areas.

One way to consider the future pathways is to use a framework that has four main livelihood pathways: traditional mobile agro-pastoralism/pastoralism; commercialisation and export trade; added value to livestock and diversification; and people exiting agro-pastoralism and seeking alternative livelihoods (Catley et al., 2016). The extent to which different households move towards the main four livelihood pathways in a given area largely depends on their access to pasture and water resources (the upper and lower limits of the diagram), and their market access (the left and right limits of the diagram)(Figure1). Socio-economic differentiation within pastoral systems, and the increased significance of wealth in determining key resource access, means that individuals and groups follow diverging pathways. Furthermore, these economic transitions occur in a wider context of human population growth of about 2% to 3% annually, equivalent to a doubling of population every 30 years or so (Catley et al., 2016).

A possible scenario for South Sudan is shown in Figure 1, based on experiences in other countries. The key challenge is equitable economic growth in the agro-pastoralist and pastoralist system, and one scenario is a substantial proportion of the populations relying heavily on diversified livelihood activities. Many of these households will probably still own small numbers of animals e.g. for some milk or occasional sales. Agro-pastoralism and pastoralism will continue to some extent in a traditional form, while some wealthier producers will become increasingly market-orientated. There could also be the emergence of more value addition to livestock products, as one form of livelihoods diversification.

Figure 1. Changing livelihoods in South Sudan



The sizes of the blue circles are indicative of the population in each circumstance.

Source: Author.

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