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The Contribution of Livestock to the Ugandan Economy

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DISCLAIMER

This report on Uganda is part of a series of Working Papers on The Contribution of Livestock to GDP in the IGAD Member States. These papers were planned and commissioned by the Inter-Governmental Authority on Development's Livestock Policy Initiative (IGAD LPI). The purpose of these papers is to provide support to Livestock Policy Hubs in the Member States to use study outcomes in their engagement with PRSP processes in their respective countries to advocate representation of livestock in national strategy documents that is commensurate with its contribution to economic growth, poverty reduction and food security.

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Roy Behnke and Margaret Nakirya

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ABBREVIATIONS

GDP	Gross domestic product
IGAD	Intergovernmental Authority on Development
ILCA	International Livestock Centre for Africa
ILRI	International Livestock Research Institute
ISIC	International Standard Industrial Classification of All Economic Activities
LPI	Livestock Policy Initiative
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries
SNA	System of National Accounts
TLU	Tropical Livestock Unit
UBOS	Uganda Bureau of Statistics
UNPS	Uganda National Panel Survey
UShs	Uganda Shilling

EXCHANGE RATE FOR UGANDAN SHILLING TO US DOLLAR 1,723 UShs (2007), 1,720 UShs (2008), 2,030 UShs (2009) and 2,177 UShs (2010) = \$1.00 USD

EXECUTIVE SUMMARY

This is the fifth in a series of reports on the contribution of livestock to the economies of the IGAD member states. Building on methodologies developed in earlier studies of the role of livestock in the economies of Ethiopia, Kenya and Sudan, the present report undertakes an assessment of the contribution of livestock to Uganda's national economy. Conventional GDP accounting may ignore some of the benefits that people derive from livestock in subsistence-oriented economies, when households directly provision themselves, when economic exchanges are not calculated in monetary terms or when these exchanges go unrecorded. The present study assigns monetary values to the non-marketed goods and services provided by livestock, and estimates the contribution of livestock to the wider national economy - as exports, as inputs into manufacturing industries, and as a component of household consumption.

Official national accounts estimates are produced by the Uganda Bureau of Statistics (UBOS).

This report supports the following conclusions:

1. In comparison to the other reports in this series, this analysis of the contribution of livestock to the Ugandan economy rests on a good but narrow data base. The data base is narrow because few field studies on livestock production have been undertaken in Uganda, probably as a result of decades of insecurity and civil war. It is therefore fortunate that **official government data on livestock production in Uganda is both up-to-date and reasonably comprehensive**. Of the four IGAD countries reviewed in this series, only Uganda has recently undertaken a national livestock census that includes pastoral livestock. Of the countries reviewed here, only Uganda will in future be attempting to base its annual livestock GDP estimates on data from regular national field surveys that include pastoral areas of the country, the twice yearly Uganda National Panel Survey (UNPS) undertaken by UBOS.
2. **Using 2009 as a basis for comparison**, this report re-estimated the contribution of livestock to agricultural GDP. Both the original official and re-estimated figures are based in large measure on official data, but the two calculations produce substantially different results. **The re-estimated livestock value added in 2009 - 1,069.407 billion US\$ (or about \$526 million US dollars at 2009 exchange rates) - is nearly double the original official estimate of 573 billion US\$ (roughly \$282 million US dollars), an increase of 86.6% over official estimates for that year.**
3. The official and revised estimates also identify different sources for the majority of Uganda's livestock output. **According to the revised estimates, cattle milk and offtake combined equal 977.526 billion US\$ or about 73% of the gross value of all livestock output**. In the light of these calculations, **cattle are by far the most economically important livestock species in Uganda**. The original official calculations paint a substantially different picture, with the majority of Uganda's livestock output coming from types of livestock other than cattle, while cattle are estimated to provide only 27% of the gross value of national livestock output. The disparity between the official and our revised assessment is due both to previously unavailable statistical data on livestock production and to the alternative computational methods used in this report to estimate the value of individual livestock products.
4. According to previous official estimates, **livestock contributed 1.7% to total national GDP in 2009; our revised estimates would now place this contribution at about 3.2% of the national total**. To put the revised livestock contribution into perspective, it is larger than the GDP derived from

either cash crops or fishing, marginally smaller than the contribution from forestry, but still only about a quarter of the value of food crop production. While livestock are vitally important to household welfare and in certain regions of the country, Uganda is not a pastoral nation on the scale of IGAD member states such as Sudan, Ethiopia or Kenya.

5. In 2009 just under half - about 47% - of the direct benefits derived by livestock owners from their animals were attributable to the financially related livelihood services provided by livestock. According to conventional national accounting procedures, the financial benefits derived by livestock owners from their animals may support farming households and thereby enhance farm output, but the increases in economic productivity that arise from these services are not identified as part of the contribution by livestock to the economy. Including financial benefits, total direct use benefits derived from livestock were 2007.390 billion US\$ or about \$989,000,000 US dollars in 2009. This figure would have been higher if we had been able to estimate the economic value of livestock ploughing and transport services, but there was insufficient evidence to quantify the importance of these aspects of livestock production.

6. The financial component of livestock output is high in Uganda because formal sector financial services are unavailable or expensive in rural areas. When the coverage provided by formal financial institutions increases and these services become more affordable, the financial component of livestock production diminishes in importance relative to the value of more tangible goods and services - milk, meat, manure, animal traction etc - as has happened in Kenya (IGAD LPI Working Paper 03-11). In sum, increasing 'normal' forms of livestock production, which are recognized in GDP accounting, is dependent, to some extent, on the provision of affordable credit and insurance for livestock owners, which permits animal owners to re-focus their production objectives on conventional types of livestock output. Until this happens, the apparent low output of Ugandan livestock will reflect, in part, the diverse and unaccounted array of services that these animals must provide for their owners.

7. Livestock and livestock products constitute a small portion of Uganda's official export trade, in the period from 2006 to 2010 never amounting to more than 1.5% of all exports by value. Informal cross-border livestock trade does take place but is unlikely to significantly increase the share that livestock contribute to national exports.

8. In 2009-10 average monthly expenditure for a household in Uganda was US\$ 232,700 (197,500 US\$ in rural and 384,350 in urban areas); food, drink and tobacco were the largest category of household expenditure, accounting on average for 45% of all expenditures (51% in rural and 32% in urban areas). Livestock food products (meat, milk, dairy products and eggs) constitute about 43% of household expenditures on food and beverages; 72% of these expenditures are in cash.

9. The production of meat and milk for domestic consumption is low in Uganda, averaging less than 11 kg of meat and about 23 litres of milk per capita per year for all Ugandans. These figures compare with an estimated availability of 41 kg of meat and 26 litres of milk per person in Sudan, and approximately 15 kg of meat and 198 litres of milk per person in Kenya.

These conclusions support the following recommendations:

Official statistics on livestock production are more than usually important in Uganda because there are few alternative sources of quantified information on livestock. The following recommendations focus on areas of concern regarding gaps in the current, official system for the collection of data and the analysis of livestock production.

1. **Livestock offtake rates:** The calculation of offtake rates in Uganda is complicated by the retrieval and consumption of dead animals by some livestock owners. By transforming a certain percentage of dead animals from an economic loss into an economic benefit, the consumption of fallen animals potentially has a significant impact on offtake rates, especially when livestock mortality rates are high, as they are for almost all types of livestock in Uganda. As well as asking about sales, slaughter and gifting of animals, future versions of the UNPS should enquire about the retrieval and consumption of dead livestock.

2. **Animal power:** None of the reports in this series - on Ethiopia, Kenya, Sudan or Uganda - has been able to obtain sufficient information to reliably estimate the economic importance of animal power. IGAD should consider introducing a region-wide programme of work on the prevalence and economic value of animal power usage in IGAD countries, a subject that is chronically neglected by both academic research and government agricultural monitoring systems. We also recommend that future versions of the UNPS include questions on the cost of ploughing services, the area ploughed by animal power on a rental basis, and the area ploughed by oxen owners for themselves.

3. **Karamoja Sub-Region:** In Karamoja, 2.4% of the nation's population produces a fifth of the nation's livestock wealth. Attempts to estimate national livestock output are therefore highly sensitive to any defects in the data on Karamoja. Aside from insecurity in the region, two other issues complicate the estimation of Karamoja livestock production. UNPS is a household not a livestock survey and uses households rather than livestock numbers as a basis for selecting its sample. Under these circumstances, caution must be taken to ensure that Karamoja households are adequately represented since these households - though few in number - hold a disproportionate percentage of the nation's livestock. Lost or stolen livestock present another challenge. There is increasing evidence of the commercialization of livestock raiding in Karamoja, with animals being stolen in order to be marketed and transported outside the region for domestic consumption or unofficial export. Although difficult to document, these animals are part of regional livestock offtake for national accounting purposes.

We recommend a specialized study of livestock production in Karamoja designed to quantify the region's contribution to national livestock output. It has been shown that returns per hectare of land in pastoral systems were 6.8 times higher than returns to ranching systems in south-western Uganda (Ocaido et al. 2009). In light of these findings, both Karamoja regional development and national livestock policy would benefit from an authoritative, evidence-based re-assessment of the value of that region's pastoral production.

4. In estimating the livestock contribution to agricultural sector GDP we recommend that UBOS consider adopting a production-based approach to calculating the gross value of individual animal products. As demonstrated in this report, the methods used in such calculations are transparent and can be readily adjusted to accommodate fluctuations in UNPS survey data.

INTRODUCTION - METHODS AND SCOPE OF THE PRESENT STUDY

This is the fifth in a series of reports on the contribution of livestock to the economies of the IGAD member states. The objective of this report is to assess the extent to which livestock's contribution to the Uganda national economy is reflected in national accounts, if necessary by assigning monetary values to the non-marketed services that livestock provide.

The overall objective of the IGAD Livestock Policy Initiative (LPI) is to enhance the contribution of the livestock sector to sustainable food security and poverty reduction in the IGAD region. The LPI project covers IGAD member states Djibouti, Ethiopia, Kenya, Somalia, Sudan and Uganda. The first report in this series examined the contribution of livestock to Ethiopia's agricultural sector GDP (IGAD LPI Working Paper No. 02 - 10, 2010). Additional reports on Ethiopia (IGAD LPI Working Paper No. 02-11), Kenya (IGAD LPI Working Paper No. 03-11), and Sudan (IGAD LPI Working Paper forthcoming) expanded the scope of the original investigation to examine livestock-related economic benefits that are not conventionally considered to be part of official GDP estimates.

Building on methodologies developed in these earlier studies, the present report undertakes an assessment of the contribution of livestock to Uganda's national economy. Conventional GDP accounting may ignore some of the benefits that people derive from livestock in subsistence-oriented economies, when households directly provision themselves, when economic exchanges are not calculated in monetary terms or when these exchanges go unrecorded. The present study assigns monetary values to the non-marketed goods and services provided by livestock, and estimates the contribution of livestock to the wider national economy - as exports, as inputs into manufacturing industries, and as a component of household consumption.

1.1 A production-based method for estimating agricultural output

The size of livestock's contribution to agricultural GDP is the most commonly quoted measure of livestock's role in the overall national economy and it is the starting point for this analysis. UBOS is responsible for estimating Uganda's GDP and, with respect to livestock, bases its estimates on both its own survey data and material provided by the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF).

The methodology developed by IGAD for estimating the livestock component of agricultural sector GDP follows a production approach. For livestock this approach involves four stages. First, national livestock populations are estimated, in this case based on projections of national livestock populations provided by the 2008 Uganda national livestock census conducted by MAAIF and UBOS. Second, production coefficients are applied to the livestock population estimates to generate estimates of the total quantity of animal products such as milk, animals for slaughter, and manure produced by the national herd. Third, national average farm gate prices are used to assign a monetary value - the gross value of production - to total output (expressed in this case in Ugandan schillings) for each kind of livestock product. Finally, input costs (intermediate costs) are deducted from the gross value of output to derive value added, the unit in which GDP is expressed.

The production approach outlined here has been used by IGAD to estimate the contribution of livestock to agricultural sector GDP in Ethiopia, Kenya and Sudan and will be the basis for this study. Using this approach, initially no distinction needs to be made between production destined for commercial sale, for immediate consumption by producers, or for export. This is an advantage in a semi-commercialized economy, such as Uganda's livestock sector, in which livestock owners consume a significant portion of what their herds produce. Home production for home consumption (or for

informal local exchange and consumption) is frequently unrecorded in official marketing statistics. By basing estimates on total product output, livestock GDP estimates do not rely on incomplete marketing data and should, in principle, include subsistence production.

UBOS's estimation techniques do not at present correspond to IGAD's production approach. Since changes to their methodology in 2007, UBOS does not estimate the volume of output for different livestock products, does not collect farm gate prices on the sale of livestock products, and does not collect information on the intermediate costs specific to different livestock enterprises (such as cattle, sheep or goat raising). UBOS methodology was, however, closer to that of IGAD LPI prior to 2007, and is likely in the next couple of years to evolve to again resemble the IGAD methods more closely. The Uganda National Panel Survey (UNPS), currently being conducted by UBOS, is a new twice yearly household survey that includes questions on livestock production. UBOS has thus far conducted three rounds of surveys and continues to refine the methodology. The system will be finalized in 2013 and the first livestock sector GDP estimates based on the survey will be available by 2014. The first round of survey data collection is now complete and results are available (Uganda National Panel Survey, 2009/2010 (Wave I): Key Findings, UBOS 2011). UBOS and MAAIF also conducted a comprehensive national livestock census in 2008 (The National Livestock Census Report, MAAIF and UBOS, 2008), which provides authoritative, recent livestock population estimates and productivity data. Taken in combination, the 2008 livestock census and UNPS survey provide the foundation for increasingly accurate estimates of the livestock contribution to agricultural sector GDP. How to best use these resources is currently under discussion in UBOS and MAAIF, and the present consultancy is well timed to constructively contribute to this discussion.

1.2 Organization of the report

This report is divided into two parts.

Part I examines what some economists have termed the 'direct use values' of livestock in Uganda. Direct use values, include the kinds of agricultural outputs that are enumerated in conventional GDP estimates - material goods such as milk and live animals for domestic consumption or export. The calculations undertaken in Part I will therefore provide a means to cross-check current Uganda GDP estimates for livestock production against a new set of estimates. Part I also examines two kinds of economic contributions made by livestock - as sources of animal power for transport or agricultural work, and as providers of financial services such as credit or insurance - that are poorly represented in standard GDP calculations organized according to international conventions. Though not exclusively, both of these kinds of economic activity tend to directly support the livelihoods of livestock owners.

Part II of the report examines some of the non-agricultural contributions livestock make to the wider economy Uganda. Agricultural value added is based on the value of unprocessed or lightly processed agricultural produce at point of first sale. Some agricultural produce is consumed at this stage, but much is taken up by other sectors of the economy that use it, modify it, and add value to it. As these livestock goods and services transit through the wider economy they continue to contribute to national GDP, not in the form of agricultural output but classified now as services or manufacturing. The multiplier or indirect benefits derived from livestock in this way appear under a variety of headings in national accounts and are not readily attributed to livestock, which makes it difficult to assess the full extent of livestock's influence on the national economy. To remedy this situation and to gain a clearer understanding of the economic linkages between livestock production and the wider economy, Part II of the report examines three different ways Ugandans use livestock outputs - for private consumption, as exports, or as inputs into other domestic industries.

PART I: DIRECT USE BENEFITS OF LIVESTOCK

2.1 Introduction

Direct use values refer to livestock outputs in the form of goods and services, both marketed and for non-commercial or subsistence use. The concept of direct use value was developed by economists attempting to quantify the economic benefits derived from the natural environment (Barbier 1993) and has subsequently been applied to livestock (Hesse and McGregor 2006).

Direct use values include but are broader than conventional definitions of Agricultural value added. Agricultural value added expresses in monetary terms the value of the goods that livestock produce - items such as live animals for slaughter and dairy products, manure, fibres, hides and skins. As long as enough of these products are traded to establish a producer price, home-produced goods that are directly consumed by livestock owners are routinely included in agricultural value added, though there may be practical difficulties in estimating the volume and value of these subsistence goods. Estimates of agricultural value added therefore include, or should include, the value of both marketed and un-marketed or informally marketed goods produced by livestock. The same cannot be said for the un-marketed services that livestock provide for their owners. For reasons discussed later in this report, the financial services provided by livestock - as credit, insurance or savings - are excluded entirely from GDP calculations, and only a part of the benefits derived from animal power are recognized, usually as contributions to transport rather than agricultural sector value added.

The concept of direct use value pulls together under one heading all the various economic benefits derived from livestock - from both goods and services, whether they are marketed or for subsistence, both in the agricultural and other sectors of the economy. This is useful for an analysis, like the present one, that attempts to construct a comprehensive estimate of the economic benefits derived from livestock. The concept of direct use also includes a broad range of livelihood benefits that livestock owners depend upon in practice, but which cannot for technical reasons be incorporated into national accounts. The concept of direct use therefore provides a more balanced expression than GDP accounting of the economic reasons why livestock owners keep and value their animals. Since agricultural value added is one component of direct use value, it is nonetheless possible to compare the results of this more inclusive assessment with those based on national accounting guidelines.

The following sections of Part I estimate the value of the goods and financial services provided by livestock to the Ugandan economy. To illustrate our methods of calculation, we estimate livestock output in 2009.

The monetary values of meat and milk output are the main components of official estimates of the contribution of livestock to agricultural value added. We therefore begin our appraisal with an estimation of these values.

2.2 Cattle milk

Dairy output is a complex result of the interaction of multiple variables - cattle breed, the percentage of cows in the herd, the proportion of those cows that lactate per year, output per lactation, the level of extraction for human use, etc.

According to the 2008 livestock census, there were 11,408,740 cattle in Uganda in 2008. 5.6% of the national herd were exotic or cross dairy breeds and 47.8% of these were cows, 32.8% of which were lactating. Based on these percentages, there were 98,000 to 100,000 lactating cows of improved breeds in Uganda in 2008 (Table 1).

Also according to the 2008 census, 27.7% of the national cattle herd consisted of indigenous Ankole cattle, 65.9% consisted of zebu and other indigenous breeds, and 0.8% were exotic beef breeds. 40.5% of indigenous cattle were cows and approximately 32.8% of these were giving milk. Beef cattle produced no milk for human consumption.

Overall, according to the census report, 8.5 litres of milk were produced per milked cow per week, 442 litres per cow per year, or 1.85 million litres of milk per day. If 1,519,580 cows give on average 422 litres per year, annual cattle milk production can be estimated to be 671,654,360 litres in 2008 based on published information in the 2008 census.

Table 1: Milking cows by breed

Breed	% National herd	Head	Cows	Milking cows
Ankole	27.7	3,160,221	1,279,890	419,804
Zebu/other	65.9	7,518,360	3,067,491	1,006,137
Exotic dairy/cross	5.6	624,590*	298,554	97,926
Exotic beef/cross	0.8	75,440*	28,064	0
All cattle	100	11,408,740*		1,519,580*

Figures for head of stock marked with are taken from the published census report and do not correspond to percentage estimates due to rounding.

Source: National Livestock Census 2008

There are marked differences in the amount of milk produced by different Ugandan cattle breeds. Table 2 provides an overview of research on the effect of these breed differences on milk output for human consumption in pastoral and farm herds. We located no research studies of on-farm milk offtake specifically from indigenous zebu breeds, the most common type of cattle in Uganda and reputedly the least productive in terms of milk output. There were 1,425,941 indigenous cows giving milk in 2008 and 97,926 improved dairy cows (Table 1); if these indigenous and improved cows produced, respectively, 508 and 1834 litres on average per annum (Table 2), total national milk production for human consumption in 2008 can be estimated at 724,378,028 litres from indigenous cattle and 179,596,284 litres from improved breeds, a total of 903,974,312 litres in 2008, an increase of about 35% over output estimates based on data in the 2008 census.

There are a number of plausible explanations for this discrepancy:

- Taking the unweighted mean of localized research study results is a crude method to determine national averages.

- Dairy researchers tend to be drawn to areas that could potentially be developed for dairy production, thereby unintentionally inflating the apparent national level of dairy output if their work is used to construct a national average
- The 35% discrepancy in output may, to some extent, represent real lost dairy output in Karamoja District as a result of the deleterious impact on pastoral livelihoods of insecurity and of intermittent government attempts at pacification (Kratli 2010; Stites and Mitchard 2011).
- Milk output was underreported in the 2008 census.

In this report we will base our estimates of livestock milk output on the lower range of values provided in the 2008 national livestock census.

According to the census, the 2008 national average producer price of milk per litre was 442 UShs. Assuming that farm gate milk prices inflated at the same rate as consumer milk prices (UBOS unpublished data), the farm gate price for milk in 2009 had increased 14.53% over that in 2008 to 506 UShs/litre. UBOS (unpublished) further assumes that the national cattle herd grew by 3% between 2008 and 2009. Assuming milk production grew apace with cattle numbers, the gross value and volume of cattle milk output in 2009 can be estimated as follows:

671,654,360 litres (production in 2008) + (671,654,360 litres * .03) = 691,803,991 litres in 2009 * 506 UShs/litre = 350.152 billion UShs in 2009.

Table 2: Milk offtake, litres per annum for Ugandan cattle breeds

Sources	Indigenous unspecified	Improved dairy, exotic or cross	Indigenous Ankole
MAAFI/ILRI 1996	545		
K2-Consult 2002	810-990 (mean 900)		
Staal and Kaguongo 2003	243	900	
MAAIF 1992	350	1200	
Kugonza et al 2011			480-550 (mean 515)
Nyombi 1994		1,402	
UNDP/FAO 1995	736 @ 60% indigenous and 40% exotic - grazed		
Galukande 2010		3120-3360 (mean 3240)	732
Petersen et al. 2003			326-561, higher range from 2+ parity (mean 444)
Grimaud et al 2007		1110-2310 (mean 1710, assuming 300 day lactation)	540 (assuming 300 day lactation)
Garcia et al. 2008	435-564 (mean 500)	2400-2700 (mean 2550)	
Ocaido et al. 2009	.88/day dry and 2.06/day wet season, lactation length not known		
Unweighted mean of available research results	508	1834	558

2.3 Goat and camel milk

In 2008 there were 12,449,656 goats in Uganda, 53% of which were female. There are references to goats being milked, primarily to provide food for children among agro-pastoral and pastoral groups in northern Uganda (Okello 1985; Dyson-Hudson and Dyson-Hudson 1969; Dyson-Hudson 1966), but we could locate no information on the amount of milk that was likely to be obtained in this way or the prevalence of this practice.

In eastern Africa, local goats generally produce 200-300 ml of milk/day for 60-90 days, have a kidding rate of about 150% per annum, and will only be milked if they give birth to a single kid (Peacock pers. com.). In the absence of evidence from Uganda, we assume that all female goats in Karamoja Sub-region are milked and none are milked elsewhere in Uganda, that each female produces 250 ml of milk for human consumption per day for 75 days each year, or about 19 litres per adult female per year. There were about 1,073,405 adult female goats in Karamoja that provided, on the above assumptions, 20,594,700 litres of milk in 2008, or (adjusting for 3% herd growth) 21,212,541 litres in 2009. At Karamoja cattle milk prices in 2008 adjusted for inflation, goat milk output in 2009 was worth: 21,212,541 litres * 618 US\$/litre = **12.978 billion US\$ in 2009.**

In 2008 there are an estimated 32,870 camels in Uganda, almost all in Karamoja Sub-Region. We located no information on the extent to which these animals were milked, but will assume for the purposes of this report that Ugandan camels produce 186 litres per annum for human consumption, which is the estimated output per head from Kenyan camels (IGAD LPI 03-11). Assuming little change in the size of the camel herd in one year and assigning camel milk the same monetary value as cattle milk, the value of camel milk production for human consumption in 2009 can be estimated as follows: 32,870 head * 186 litres/head * 618 US\$/litre = 3,778,340,760 US\$ or **3.778 billion US\$ in 2009.**

2.4 Cattle offtake

Net cattle offtake in 2009 according to the UNPS Wave 1 results can be estimated to lie between 10.15% and 14.17%. Net offtake is defined here as the sum of gifts out, sales, slaughter and 20% of all deaths, less gifts in and less animals purchased, relative to opening herd size. A portion of all dead or lost animals is included in offtake on the assumption that significant numbers of fallen animals are eaten and that a proportion of stolen animals are either consumed or sold for consumption. UBOS (unpublished) estimated the size of the national cattle herd in 2009 at 11,751,000 head. At an assumed net annual offtake rate of 10.15% (based on the assumed recovery of 20% of fallen or lost animals) the national cattle herd yielded an offtake of 1,192,726 head valued at 526,118 US\$/head (UPNS unpublished) and worth in total 627.374 billion US\$ in 2009. A 14.17% annual offtake (based on the assumed recovery of 50% of dead or lost cattle) yielded 1,664,753 head of offtake valued at 526,118 US\$/head (UPNS unpublished) or 875.856 billion US\$. in 2009. **The gross value of cattle offtake in 2009 is estimated to lie between 627.374 and 875.856 billion US\$ depending on the assumed proportion of dead or lost animals that are consumed, a variable which appears never to have been documented.**

The range of probable Ugandan cattle offtake rates derived from UNPS - approximately 10% to 14% per annum - conforms broadly to rates documented elsewhere in eastern Africa in this report series: 9% in Ethiopia, 12.8% in Kenya and 15% in Sudan. In Uganda, the *Agricultural Policy Committee Report on Economics of Crops and Livestock Production* employed an annual cattle

offtake rate of 11% in their analysis, but provided no justification or evidence for this rate (Ministry of Planning and Economic Development 1997). The Uganda Programme for Trade Opportunities and Policy (UPTOP) estimated commercial cattle offtake rates of 12% with an additional 3% consumed by herd owners (Greenbelt Consult 2006). Nyombi reported culling rates between 20 and 30% per annum in intensive dairy herds in the early 1990s (Nyombi 1994), and FAO estimated an 11.6% offtake rate for cattle in the early 2000s (FAO 2005). Ocaido et al. (2009) documented annual cattle offtake rates for ranches and pastoralists in south western Uganda of 21 to 28%, but these rates were elevated by a drought that led to higher than usual levels of sales during the study period.

2.5 Sheep, goat and camel offtake

In 2009 the annual net goat offtake rate (the sum of gifts out, sales, slaughter and 20% of all deaths, less gifts in and less animals purchased, relative to opening herd size) was 33.45% based on UNPS Wave 1 results. At this rate, a goat population of 12,823,000 head yielded an estimated offtake of 4,289,293 head valued at 42,411 US\$ per head, totalling **181.913 billion US\$ in 2009**.

In 2009 the annual net sheep offtake rate (the sum of gifts out, sales, slaughter and 20% of all deaths, less gifts in and less animals purchased, relative to opening herd size) was 22.2% based on UNPS Wave 1 results. At this rate, a sheep population of 3,513,000 head yielded an estimated offtake of 779,886 head valued at 45,366 US\$ per head, totalling **35.380 billion US\$ in 2009**.

In 2008 there were an estimated 32,870 camels in Uganda. We could locate no information on the rates of offtake or the sale price of these animals. For purposes of this calculation we will assume that the size in 2009 of the national camel herd in Uganda did not change from the census estimate in 2008 and that the offtake rate from this herd is identical to the estimated offtake from Kenyan camel herds - 1.75% per annum. In Kenya the market value of a average camel was approximately 1.60 that of marketed cattle; assuming the same relative value of cattle and camels in Uganda, the sale value of a Uganda camel in 2009 was $1.60 * 526,118 \text{ US\$}$ (the sale value of cattle in Uganda in 2009) = 841,789 US\$/camel. On this basis the estimated value of camel offtake in 2009 was $32,870 * 0.0175 * 841,789 \text{ US\$/head} = 484,218,077 \text{ US\$}$ or **.484 billion US\$**.

It should be noted that these estimations are highly sensitive to the assumed rate at which dead or lost animals are recovered, consumed and therefore become a component of offtake rather than loss. No research was available on recovery rates for fallen animals in Uganda, but because mortality rates are high, different assumed rates of recovery generate large variations in the estimated gross value of output. For example, increasing the assumed recovery rate for goats from 20% to 50% increases the estimated gross value of goat offtake from 181.913 to 233.850 billion US\$, and doing the same for sheep increases offtake from 35.380 to 54.186 billion US\$.

In 2002, FAO estimated annual offtake rates for goats at 30.8% and for sheep at 36.2%, i.e., a rate broadly similar to 33% derived for goats from the UNPS data but much higher than the UNPS annual offtake rate for sheep at 22%. In south western Uganda, Ocaido et al. (2009) documented goat offtake rates of 38% (inclusive of sales, goats eaten, given out and stolen).

2.6 Pig offtake

In 2009 the annual net pig offtake rate (the sum of gifts out, sales, slaughter and 20% of all deaths, less gifts in and less animals purchased, relative to closing herd size) was 22.32% based on UNPS Wave 1 results. At this rate, a pig population of 3,280,000 head yielded an estimated offtake of 732,096 head valued at 42,198 US\$ per head, totalling **30.893 billion US\$** in 2009.

The estimated FAO pig offtake rate for 2002 was 82% (FAO 2005), much higher than the 22% rate derived from the UNPS survey results for 2009. On the other hand, the Uganda Programme for Trade Opportunities and Policy (UPTOP) estimated pig offtake rates of 20% (Greenbelt Consult 2006).

2.7 Poultry production

In this report we use the UBOS estimate (unpublished) of the gross value of poultry production - meat and eggs - in 2009: **89 billion US\$**.

2.8 Manure for fertilizer

Available evidence suggests that manure for fertilizer is not used consistently by Ugandan farmers, that it is not sold in most communities and does not have an established monetary value, which precludes its inclusion in GDP estimates. Ocaido et al. (2009) found that manure contributed to 2.7 to 4.4% of total cattle herd output from pastoral and ranch herds, respectively, but was not sold in south western Uganda. An examination of various levels of dairy farm intensification found that manure was not a binding constraint on crop production on these farms; at best, farmers used as fertilizer 15% of the manure their herds produced (Nanyeenya et al 2008). This study concluded that manure had a shadow price of zero.

While it is clear that manure has an agronomic value in sustaining crop and rangeland productivity, it would seem that manure has negligible economic value for farmers given the levels of intensification characteristic of farming systems in Uganda.

2.9 Animal power

The following citations and quotations attest to the importance of oxen draught power in certain agro-pastoral and farming systems in Uganda, the century-long history of oxen use in some areas, and the continuing interest of various government programmes in promoting oxenization for development purposes:

- In agro-pastoral areas of Soroti District, 'cattle herd composition was usually geared towards supporting traction with bulls and steers constituting over 36.4% of the herds (Ocaido et al 2009: 5). In this area 95% of households used bulls and steers for ploughing, transport of building materials, firewood and harvests. At the time of study in the early 2000s, the average daily hire rate for oxen was 4,000 US\$ or about 2.80 US dollars per day (Ocaido et al. 2005).
- In Pallisa District of eastern Uganda (Teso farming system) oxen ploughing was introduced in 1910 and flourished in conjunction with cotton farming through the 1970s. From 1985 to 1991 the cattle herd fell from 123,000 head to 2,000 due to insecurity, and cotton farming collapsed. At present, all but the poorest category of farmers owns ox ploughing equipment and at least one ox to team with another farmer for draught power (Ebanyat et al. 2010; see also Nyugo and Olupot 1999; Barton et al. n.d.).

- 'In some areas like Lira and Soroti in the northeast, draught power is essential as it provides a link between crops and livestock systems. Currently, only 35% of farmers in Lira are estimated to own draught oxen - far below the levels in the 1980s. Although households with an off-farm income source have been able to restock with draught oxen, poor rural households continue to till the soil with hoes'. 'Only about 40% of households within the cattle corridor own livestock and only 5% of households own oxen for ploughing in areas where animal traction for cultivation was the mode pre-insurgency' (African Development Fund, National Livestock Productivity Improvement Project, Appraisal Report 2002: pages 11 and 12).
- Maize cultivation with ox-drawn ploughs was introduced to the Sabei agro-pastoralists occupying the plains at the base of Mt. Elgon in the period before World War I (Goldschmidt 1969).
- Along with food and building materials, ox ploughs were one of the incentives provided by the government to encourage voluntary disarmament in Karamoja in 2001-02 (Stites and Akabwai 2010).

The national livestock census of 2008 asked livestock owners about their possession of hoes, pangas, garden forks and slashers; the census did not enquire about and contains no information on the ownership of oxen chains or ploughs. The published report from the census also contains no information on the number of oxen in Uganda that are trained or used for ploughing or haulage. As it is presently worded, the UNPS survey questionnaire enquires about ox-ploughs, but the results from this question have not yet been tabulated; the questionnaire does not enquire about the ownership or use of draught oxen or about the costs of renting ploughing services.

2.10 Blood

A large ox will yield 4 litres of blood in the rains and be ready to bleed again in 5 months; dry season yields are much lower (Dyson Hudson 1966). Based on the information provided by Dyson Hudson, 6 litres per ox per year would seem to be a conservative estimate of blood yield from an adult male animal, but we could locate no further quantified data on annual blood production. If all indigenous adult male cattle in Karamoja Sub-Region are bled, but no cattle are bled elsewhere in Uganda, then 354,732 animals were bled in 2008, producing 2,128,393 litres of blood in total in 2008, or (with 3% herd growth) 2,192,245 litres in 2009. We have no information of the cash value of cattle blood, or indeed if there is a market for blood that could be used to establish a shadow price for this product. Until more data is available, we will price cattle blood at the market value of milk in Karamoja in 2009, 618 US\$ /litre. The estimated value of cattle blood is 2,192,245 litres * 618 US\$ /litre = 1,354,807,410 US\$ or **1.355 billion US\$ in 2009**.

2.11 Honey production

According to the livestock census, in 2008 Uganda produced 2600 metric tons of honey; we were unable to locate information on farm gate prices for honey, and therefore cannot estimate the monetary value of honey output.

2.12 Financially related livelihood services provided by livestock

2.12.1 Livestock as credit

The credit or financing benefits of livestock derive from the ability of livestock owners to dispose of their animals for particular purposes at a time that they choose - their ability to 'cash in' on the value of their animals as needed. This flexibility gives livestock owners access to money without the need to borrow and confers an additional financial benefit beyond the sale, slaughter or transfer value of their livestock. This additional financial benefit can be estimated as the opportunity cost of rural credit - what it would otherwise cost a livestock owner to obtain funds comparable to those produced by liquidating a part of the herd (Bosman et al. 1997). Employing this method of estimation, the additional finance value of a livestock holding is equivalent to the interest that the owners would be required to pay to obtain loans equal to the value of their livestock offtake.

Research suggests that the substitution of livestock sales for access to credit is a practice actually engaged in by Ugandan farmers. Balikowa (2004) reported that the lack of capital was a significant constraint for dairy farmers, the majority of whom lacked access to credit facilities and indicated that interest rates were high. Under these circumstances, 'Many farmers fear to borrow due to uncertainty in the profitability of dairy enterprises while other[s] lack the necessary collateral security. Others prefer to sell some of the animals in order to finance the farm operations and therefore do not need to borrow from financial institutions' (Balikowa 2004: 12). Our challenge is to establish the level of financial benefit that can be reasonably imputed to the use of livestock sales as a substitute for credit.

In the early 1990s in Uganda, formal lending interest rates fell from 37% to about 20-25% (Mbuza et al 1995). Average bank lending interest rates continued to decline to about 20% in the decade up to 2006 (Wabukawo 2008), and microfinance annual interest rates to farmers were 13% following a government credit scheme launched in 2006-07 (Kasirye 2007). In a recent study, Matovu and Luke (2010) found that:

- the majority of informal lenders charged annual interest rates of 11-20%,
- a minority of informal lenders charged more than 50% per year,
- formal traditional credit sources were charging 21-30%,
- but over 40% of all borrowers paid no interest whatsoever.

Matovu and Luke did not attempt to estimate average rural interest rates. The *Uganda National Household Survey 2009/2010: Socio-Economic Module* (UBOS 2010) contains a wealth of information on credit availability and use in Uganda. Unfortunately, it contains no information on average credit interest rates in rural areas, although it did confirm that the vast majority of rural households obtain credit from informal sources (Kasirye 2007).

An idea of the significance of personal lending on mean rural credit interest rates can be estimated from data in Kenya, where we do have a recent national survey that included both institutionalized (formal and informal) and private lending. In Kenya institutionalized credit interest rates in rural areas ran at about 25% p.a., although roughly half of all lending was not conducted through institutions, but was done privately among neighbours, friends and kin. When

this personalized lending was taken into consideration, apparent mean rural interest rates fell from 25% p.a. to 6.3% per annum (KNBS 2006).

If the situation in Kenya is any indication, it is likely that no one actually knows the prevailing average interest rate on rural credit in Uganda. In the absence of evidence, we will in this study use the rural Kenya interest rate of 6.3% p.a. The total estimated value of national livestock offtake in 2009 is given in Table 3.

Table 3: Value of livestock offtake in 2009, billion USH

Livestock species	Total
Cattle	627.374
Camel	.484
Sheep	35.380
Goat	181.913
Pig	30.893
Total	876.044

At an assumed annual interest rate of 6.3%, the total imputed value of Uganda livestock (excluding poultry) as a source of credit to their owners is estimated to be 876.044 billion USHs * .063 = 55.191 billion USHs in 2009

2.12.2 Self-insurance

Part of the insurance or security value of livestock comes from the ability of owners to liquidate their own herds in an emergency. In this instance, the level of security provided to a particular individual depends on the value of that individual's assets, and livestock ownership functions as self-insurance. The value of this form of asset-based insurance can be calculated as the annual cost that herd owners would need to pay to purchase insurance coverage equal to the capital value of their herd (Bosman et al. 1997).

While sound in theory, this method is difficult to implement in Uganda, which does not yet have a national health insurance scheme (Kagumire 2009; NBS Television 2011), where the formal insurance market is small, and where by 2006 only one commercial insurance company even offered health insurance (Zikusooka et al 2008). Research for this report uncovered no documented availability of formal health insurance coverage for rural Ugandans, and hence no basis on which to impute the insurance value of their livestock. Elsewhere in eastern Africa, the relevant insurance premium was estimated at 0.4848% in Kenya, 2.4% in Sudan and 10% in rural Ethiopia (IGAD LPI WP numbers 02-11, 03-11 and forthcoming). In the absence of additional evidence, we assume that insurance in rural Uganda costs 10% of the value of the coverage provided, as it does in Ethiopia where formal rural insurance coverage is also generally unavailable and insurance is instead provided by voluntary self help associations.

Valuing retained livestock at 75% of the sale price of marketed animals, Table 3 gives the estimated capital value of Ugandan livestock - 5,288.761 billion USHs in 2009. The value of these

animals as asset-based insurance at a premium rate of 10% can be estimated as $5,288.761 * 0.10 = 528.876$ billion US\$ in 2009.

Table 4: The capital value of Ugandan livestock in 2009

Livestock species	2009 population	Mean producer sale price/head US\$	Assumed mean value/head at 75% of sale price US\$	Capital value of stocks - billion US\$
Cattle	11,751,000	526,118	394,588	4,636.804
Sheep	3,513,000	45,366	34,024	119.526
Goats	12,823,000	42,411	31,808	407.874
Camels	32,870	841,789	631,342	20.752
Pigs	3,280,000	42,198	31,648	103.805
Total				5,288.761

2.12.3 Risk pooling

For livestock owners the insurance value of livestock derives not only from their ability to liquidate their individual herds, but also from their ability to call upon assistance from fellow stock owners in time of need. These collective insurance schemes are based on the gifting and loaning of livestock within rural communities. Since transfers are in-kind - meat, milk, live animals and traction/transport services - contributions into these systems are roughly comparable to withdrawals from them. The value of the system from the perspective of resource givers and receivers is therefore approximately equal: recipients extract a level of support from the system that equals what donors are willing to contribute. The value of this communal system of livestock insurance is therefore approximately equal to the level of livestock loaning and gifting within rural communities.

Table 5 estimates the value of Ugandan livestock involved in 2009 in exchanges between livestock owners. For each species excepting camels, the average annual rate at which animals are gifted from herds is taken from a preliminary analysis of the UNPS Wave 1 survey results. We assume that camels are gifted at the same rate as cattle, that small stock (pigs, sheep and goats) are disposed by their new owners within a year of their transfer, and that large stock (cattle and camels) remain in the recipients herd for three years. Based on these assumptions, the total value of livestock involved in gift exchanges in 2009 was 353.916 billion US\$, which was also the approximate value of the insurance/risk pooling benefit derived from these exchanges. The total value derived from using livestock exchanges to collectively buffer risk was 353.916 billion US\$ in 2009.

Table 5: The value of gifted stock in 2009, billion US\$

Livestock species	Annual gifting rate	% of herd gifted	Capital value of stocks - billion US\$	Value of gifted stocks
Cattle	2.2%	6.6	4,636.804	306.029
Sheep	4.9%	4.9	119.526	5.857
Goats	7.5%	7.5	407.874	30.591
Camels	No data	6.6	20.752	1.370
Pigs	9.7%	9.7	103.805	10.069
Total				353.916

2.13 Summary of Part I

In comparison to the other reports in this series, this analysis of the contribution of livestock to the Ugandan economy rests on a good but narrow data base. The data base is narrow because, aside from research on cattle milk production and dairying reviewed in Section 2.2, few field studies on livestock production have been undertaken in Uganda, probably as a result of decades of insecurity and civil war. Unlike Ethiopia and Kenya, and to a lesser extent Sudan, there is no substantial, independent body of scientific or project-based research that can be used to cross-check official figures. It is therefore fortunate that official government data on livestock production in Uganda is both up-to-date and reasonably comprehensive. Of the four IGAD countries reviewed in this series, only Uganda has recently undertaken a national livestock census that includes pastoral livestock. Of the countries reviewed here, only Uganda will in future be attempting to base its annual livestock GDP estimates on data from twice-yearly national field surveys (the Uganda National Panel Survey conducted by UBOS), rather than projections based on assumptions and indices or, as in Ethiopia, on field surveys that exclude pastoral areas of the country.

Table 4 summarizes the unpublished calculations that lie behind the official 2009 estimate of the livestock contribution to agricultural GDP.

Table 4 Official estimates of livestock production in 2009: gross value and value added, billion US\$

Product group	Gross value of output	Value added
Cattle	482	185
Goats and other animals	1227	343
Poultry	89	45
Total	1789	573

Source: UBOS unpublished

Table 5 summarizes our re-estimation for 2009 of the livestock contribution to agricultural GDP.

Table 5: Livestock production in 2009: gross value, input costs and value added, billion US\$

Product	Billion US\$
Cattle milk	350.152
Goat milk	12.978
Camel milk	3.778
Subtotal milk	366.908
Cattle offtake	627.374
Goat offtake	181.913
Sheep offtake	35.380
Camel offtake	0.484
Pig offake	30.893
Subtotal animal offtake¹	876.044
Poultry production	89.000
Manure for fertilizer	No estimate
Animal power	No estimate
Blood	1.355
Honey production	No estimate
Change in stocks	No estimate
TOTAL LIVESTOCK OUTPUT	1,333.307
Cost of livestock inputs²	263.900
Value added by livestock production	1,069.407

Notes: ¹Offtake values are based on the assumed recovery of 20% of dead or lost cattle, goats, sheep and pigs, and no recovery of camel carcasses. Assuming an increased recovery rate of 50% for cattle, goats and sheep increases the value of estimated offtake to 1,195.263 billion US\$.

²Estimated input costs on based on a preliminary analysis by UBOS of UNPS Wave 1 results.

Both the official and re-estimated sets of calculations are based in large measure on official data, for the reasons noted above, but otherwise there is little similarity. Most obviously, the two calculations produce substantially different results. The re-estimated livestock value added - 1,069.407 billion US\$ - is nearly double the original official estimate of 573 billion US\$, a discrepancy that is all the more puzzling because the official estimates attribute a higher gross value to livestock output than do the revised estimates, 1789 billion US\$ for the official estimate versus 1,333.307 billion US\$ for the revised estimate. The two sets of calculations also identify

different sources for the majority of Uganda's livestock output. According to the revised estimates, cattle milk and cattle offtake combined equal 977.526 billion US\$ or about 73% of the gross value of all livestock output. In light of these calculations, cattle are by far the most economically important livestock species in Uganda. The original official calculations paint a substantially different picture, with the majority of Uganda's livestock output coming from sources other than cattle, which are estimated to provide only 27% of the gross value of national livestock output (Table 4).

These conflicting results are a consequence of combining different analytical methods with different sources of data. Analytically, the revised figures are based on an attempt to estimate the quantity and value of individual animal products, and these individual values are then combined to provide an overall picture of livestock output. The official figures are, in contrast, based on indexed values ascribed to bundles of livestock products derived from individual livestock species (such as cattle) or the aggregated output of several species (as in 'goats and other animals'). In terms of data, both the 2008 livestock census results and a preliminary analysis of the livestock data in the first round of the UNPS survey were available for our revised estimates. Official estimates will not utilize these data sources until the national accounts are officially rebased. **Compared to the official figures, these differences in data and analytical methods have produced an 78% increase in the estimated size of the contribution made by livestock to agricultural GDP in 2009, the year chosen for this comparison.**

Table 7 summarizes our estimates of the direct economic benefits obtained both from livestock products (as a portion of agricultural GDP) and from livestock services (normally not part of GDP estimates).

Table 7: Direct use benefits derived from livestock in 2009, billion US\$

Type of benefit	Value added from livestock products	Services not currently in GDP estimates
Value added livestock products	1,069.407	
Benefit from financing/credit		55.191
Benefit from self-insurance		528.876
Benefit from risk pooling/stock sharing		353.916
Transport and traction power from equines		No estimate
Ruminant animal power		No estimate
Sub-totals	1,069.407	937.983
Total direct economic benefits	2007.390	

Just under half - about 47% - of the direct benefits derived by livestock owners from their animals are attributable to the financial services provided by livestock. According to conventional national accounting procedures, these financial self services may support farming households and thereby enhance farm output, but the economic benefits that arise from these services are not

identified as part of the contribution by livestock to the economy. The quantification of these benefits nonetheless contributes to a clearer understanding of the economic functions of livestock at both household and national levels. In particular, the high ratio of financial service benefits relative to other kinds of livestock production highlights the unavailability and high cost of formal financial services in rural Uganda. The cost of formal financial services determines the value to be attributed to the untraded, asset-based, financially related services provided by livestock for their owners. In Uganda, the financial benefits imputed to livestock are high because formal financial services are expensive, as they are in Ethiopia (IGAD LPI Working Paper 02-11). When the coverage provided by formal financial institutions increases in the rural areas and these services become more affordable, as has happened in Kenya, the financial component of livestock production diminishes in importance relative to the value of more tangible goods - milk, meat, manure, etc - or services - such as animal traction and transport (IGAD LPI Working Paper 03-11). In sum, increasing 'normal' forms of livestock production, which are recognized in GDP accounting, is dependent, to some extent, on the provision of affordable credit and insurance for livestock owners, which permits animal owners to re-focus their production objectives on conventional types of livestock output. Until this happens, the apparent low output of African herds will reflect, in part, the diverse (and unaccounted) array of services that these animals must provide for their owners.

PART II: CONTRIBUTION OF LIVESTOCK TO THE WIDER ECONOMY

3.1 Introduction

This final part of the report examines three different ways the Uganda economy uses livestock products - for private consumption, as inputs into other domestic industries, and as exports.

3.2 The role of livestock in household consumption and expenditure

In 2009-10 average monthly expenditure for a household in Uganda was US\$ 232,700 (197,500 US\$ in rural and 384,350 in urban areas); food, drink and tobacco were the largest category of household expenditure, accounting on average for 45% of all expenditures (51% in rural and 32% in urban areas) (UBOS 2010). The amount and kind of monthly household expenditure on livestock food items is shown in Tables 8 and 9.

Livestock food products (meat, milk, dairy products and eggs) constitute about 43% of household expenditures on food and beverages; 72% of these expenditures are in cash. For other categories of expenditure that might be expected to be supported in some measure by livestock production (transport or clothing, for instance) available evidence does not allow the disaggregation of the livestock contribution.

Table 8: Monthly household consumption expenditure for livestock products, US\$

Item	Purchased consumption		Consumption of home produce	Received in kind/free	Total
	Household	Away from home			
Beef	67,522,000,000	15,017,500	2,203,531,125	2,468,118,900	72,208,667,525
Pork	11,392,300,000	130,166,100	228,744,200	354,633,850	12,105,844,150
Goat meat	14,154,700,000	24,357,800	2,122,737,100	516,683,500	16,818,478,400
Other meat	1,597,095,250	13,880,000	1,244,739,800	212,970,800	3,068,685,850
Chicken	13,996,200,000	130,952,000	21,610,500,000	1,886,710,500	37,624,362,500
Eggs	5,894,521,700	47,601,900	2,645,669,050	160,589,900	8,748,382,550
Milk	27,300,900,000	74,357,600	16,997,700,000	1,251,551,750	45,624,509,350
Infant formulae	648,351,800	-	13,564,800	20,972,150	682,888,750
Ghee	2,167,409,805	-	612,812,250	50,974,000	2,831,196,055
Total-Livestock	144,673,478,555	436,332,900	47,679,998,325	6,923,205,350	199,713,015,130
Percentage of total	72	0	24	3	100

Source: UBOS 2010, calculated from unpublished data

Table 9: Monthly per household consumption expenditure for livestock products, US\$

Item	Consumption out of purchases		Consumption out of home produce	Received in kind/free	Total
	Household	Away from home			
Beef	6,542	1	214	239	6,996
Pork	4,554	52	91	142	4,839
Goat meat	5,503	9	825	201	6,539
Other meat	3,259	28	2,540	435	6,262
Chicken	3,704	35	5,719	499	9,957
Eggs	1,134	9	509	31	1,683
Milk	2,326	6	1,448	107	3,887
Infant formulae foods	3,125	-	65	101	3,291
Ghee	1,307	-	370	31	1,708
Total-Livestock	31,455	141	11,782	1,785	45,164

Source: UBOS 2010, calculated from unpublished data

In 2009 the population of Uganda was estimated to be 30.7 million people. Based on product output estimates developed in this report, Table 10 estimates the quantities of livestock foods available for consumption by this population in 2009.

Table 10: Meat and milk available for domestic consumption, 2009

	Total offtake	Official exports	Offtake for domestic consumption	Total meat and offal or milk, tons for domestic consumption ¹	Per capita, kg or litres/Year
Cattle offtake, head	1,192,726	10,912	1,181,814	177,272,100	5.77
Camel offtake, head	575	0	575	89,125	0
Sheep offtake, head	779,886	0	779,886	10,918,404	0.36
Goat offtake, head	4,289,293	65,165	4,224,128	50,689,536	1.65
Ruminant total	-	-	-	238,969,165	7.78
Poultry offtake ²	5,859,303	0	35,859,303	46,617,094	1.52
Pig offtake	732,096	5,142	726,972	43,618,320	1.42
Total all meat	-	-	-	329,204,579	10.72
Milk offtake, litres ³	719,130,352	0	719,130,352	719,130,352	23.42

Notes: ¹Based on carcass weights (including meat and edible offal) of 150 kg for cattle, 155 kg for camels, 14 kg for sheep, 12 kg for goats, 60 kg for pigs and 1.3 kg for poultry (FAO 2005).

²Based on 39,843,670 head of poultry (including chickens, ducks, turkeys' geese, guinea fowl and other birds) according to the 2008 livestock census, no assumed flock growth in 2009, 90% offtake rate (UBOS unpublished) and 1.3 kg carcass weight per bird.

³Fluid milk from cattle, goats and camels available for consumption or processing into dairy products.

3.3 Livestock products as inputs into manufacturing

In 2009 food processing accounted for 40.3% of Uganda's manufacturing value added (UBOS unpublished) and meat preparation and dairy processing accounted for 3% of all food processing. In 2009 animal feed production constituted 0.9% and leather and footwear production made up 0.6% of total industrial production (UBOS unpublished).

According to an analysis of livestock export competitiveness in 2006, by that date livestock processing infrastructure - abattoirs, hides and skins processors, and dairy processing companies - were underdeveloped (Greenbelt Consult 2006).

3.4 The export of livestock and livestock products

In the period from 2006 to 2010, livestock and livestock products constituted a small portion of Uganda's formal export trade, never amounting to more than 1.5% of all exports by value (Table 11). Table 12 gives the species composition of estimated unofficial livestock exports from 2008 to 2010.

Table 11: Formal exports of livestock products - quantity, value and percentage of all export value

Commodity	unit	2006	2007	2008	2009	2010
Cattle hides	Tonne	22,214	20,942	13,042	5,160	120,869
	'000 US \$	8,032	18,114	12,518	5,996	17,061
	% value	0.8	1.4	0.7	0.4	1.1
Live animals	'000 head	0	23	95	198	7
	'000 US \$	28	1,551	1822	3,908	3,985
	% value	0.0	0.1	0.1	0.2	0.2

Source: Statistical Abstract 2011, UBOS 2011

Table 12: Informal live animal import-export, 2008-10

	2008	2009	2010
Imports of live animals, number			
Cattle	1508	562	530
Goats	3516	2571	2540
Pigs	7032	5142	5080
Sheep	12057	8275	8150
Exports of live animals, number			
Cattle	10254	10912	44839
Goats	53871	65165	65463
Pigs	602	449	619
Sheep	17788	24051	31878

Source: UBOS unpublished

3.5 Summary of Part II

Livestock make a modest contribution to the non-agricultural sectors of Uganda's economy. In comparison to the other IGAD countries reviewed in this report series, livestock and their products make up a small part of Uganda's exports, the per capita production of meat and milk for domestic consumption is low, and Ugandans spend a moderate proportion of their household food budget on livestock-derived foods.

While livestock are essential to the livelihoods of people in certain parts of the country, Uganda's overall economy does not depend on livestock production to the same extent as that of Sudan, Ethiopia and Kenya.

CONCLUSIONS AND RECOMMENDATIONS

Aside from work done since the 1990s on dairying, little recent field research has been conducted on the performance of Ugandan livestock production systems. The reappraisal carried out in this report of the contribution of livestock to the national economy is, therefore, heavily dependent on data produced by government monitoring and statistical services. The results of this reassessment nonetheless conflict with official figures, estimating an increase of 87% above official estimates of the contribution of livestock to agricultural GDP in 2009, the year selected to make this comparison. The disparity between the official and our revised assessment is due both to previously unavailable statistical data on livestock production and to the alternative computational methods used in this report to estimate the value of individual livestock products.

According to previous official estimates, livestock contributed 1.7% to total national GDP in 2009; our revised estimates would now place this contribution at about 3.2% of the national total. To put the revised livestock contribution into perspective, it is larger than the GDP derived from either cash crops or fishing, marginally smaller than the contribution from forestry, but still only about a quarter of the value of food crop production. While livestock are vitally important to household welfare and in certain regions of the country, Uganda is not a pastoral nation on the scale of IGAD member states such as Sudan, Ethiopia or Kenya.

GDP estimates exclude an unusually high proportion of the direct benefits generated by Ugandan livestock. The financial component of livestock output is high in Uganda because formal sector financial services are unavailable or expensive in rural areas. At nearly half of total livestock output, the imputed value of the financial services provided by livestock in Uganda is a larger component of overall livestock output than in any of the other countries reviewed here - Sudan, Ethiopia and Kenya. In Uganda in particular, conventional definitions of value added exclude from national accounts a large proportion of the economic benefits that motivate many rural people to own livestock.

By misconstruing the reasons people keep livestock, outside observers may also undervalue the kinds of animals people keep. Because they provide a source of affordable credit and insurance, rural people may choose to hold animals that are durable and, hence, likely to retain their financial value, but are relatively unproductive in other, more conventional ways. Seen in these terms, conventional GDP accounting may promote a misinterpretation of the factors that motivate rural people to keep animals and obscure the circumstances that will induce them to engage in new kinds of livestock production.

The production of meat and milk for domestic consumption is low in Uganda, at less than 11 kg of meat and about 23 litres of milk per capita per year. These figures compare with an estimated availability of 41 kg of meat and 26 litres of milk per person in Sudan, and approximately 15 kg of meat and 198 litres of milk per person in Kenya.

These conclusions support the following recommendations:

Official statistics on livestock production are more than usually important in Uganda because there are few alternative sources of quantified information on livestock. The following recommendations focus on areas of concern regarding gaps in the current, official system of data collection and analysis of livestock production.

1. **Livestock offtake rates:** The 2008 livestock census collected information on egg, honey and milk production but, for reasons that are unclear, did not enquire about meat output in the form of animal offtake rates. This oversight is difficult to remedy through short-term studies because offtake rates fluctuate widely with variations in rainfall, and short-term studies are unlikely to provide a balanced assessment of average rates over the longer term. The regular biannual monitoring of livestock offtake in the UNPS is therefore particularly important.

The calculation of offtake rates in Uganda is complicated by the retrieval and consumption of dead animals by some livestock owners. By transforming a certain percentage of dead animals from an economic loss into an economic benefit, the consumption of fallen animals potentially has a significant impact on offtake rates, especially when livestock mortality rates are high, as they are for almost all types of livestock in Uganda. We could find no documentation of the percentage of dead animals that are consumed, although this form of offtake is likely to be an important channel through which some rural Ugandans supplement their diets, especially in drought conditions in pastoral areas. As well as asking about sales, slaughter and gifting of animals, future versions of the UNPS should enquire about the retrieval and consumption of dead livestock.

2. **Animal power:** As it is presently worded, the UNPS survey questionnaire enquires about the ownership and rental of ox-ploughs but does not enquire about the ownership or use of draught oxen or about the costs of renting ploughing services. The rental of ploughing services can be used to establish the monetary value of ploughing by oxen, either on a rental basis or by the farmer's own animals. We recommend that future versions of the UNPS include questions on the cost of ploughing services, the area ploughed by animal power on a rental basis, and the area ploughed by oxen owners for themselves.

None of the reports in this series - on Ethiopia, Kenya, Sudan or Uganda - has been able to obtain sufficient information to reliably estimate the economic importance of animal power. IGAD should consider introducing a region-wide programme of work on the prevalence and economic value of animal power usage in IGAD countries, a subject that is chronically neglected by both academic research and government agricultural monitoring systems.

3. **Karamoja Sub-Region:** Karamoja Sub-Region contains about 3% of the population of Uganda and about 80% of the households in this sub-region own livestock (2002 population census; UBOS 2009). The livestock owners of Karamoja therefore constitute about 2.4% of the national population, but these people own about 20% of the nation's cattle, 16% of its goats, nearly half of all sheep, over 90% of the donkeys and virtually all camels (UBOS 2009). If we apportion gross national livestock output strictly by regional herd sizes, Karamoja produces just under 20% of Uganda's livestock output by value. In other words, 2.4% of the nation's population produces a fifth of the nation's livestock wealth, and has likely done so for some time. The proportion of the national cattle herd located in the sub-region in 2008 was virtually unchanged from the last census conducted in the early 1960s - approximately 19-20% of the nation's total (Ministry of Agriculture and Co-operatives 1965).

Any attempt to quantify the economic contribution of livestock to Uganda must come to terms with Karamoja. This is not easy. The 1990-91 national census of agriculture and livestock excluded much of Karamoja 'due to the then existing security situation' (MAAIF 1993:2). Some analysts reject the 2008 Karamoja livestock census figures as too high for some north-eastern

districts (Benson and Mugarura 2010), while others suspect they are too low (Kratli 2010)¹. Aside from insecurity in the region, two other issues complicate the estimation of Karamoja livestock production. UNPS is a household not a livestock survey and uses households rather than livestock numbers as a basis for selecting its sample. Under these circumstances, caution must be taken to ensure that Karamoja households are adequately represented since these households - though few in number - hold a disproportionate percentage of the nation's livestock. Lost or stolen livestock present another challenge. There is increasing scholarly evidence of the commercialization of livestock raiding in Karamoja, with animals being stolen in order to be marketed and transported outside the region for domestic consumption or unofficial export (Eaton 2010). Although difficult to document, these animals are part of regional livestock offtake for national accounting purposes.

We recommend a specialized study of livestock production in Karamoja designed to quantify the region's contribution to national livestock output. It has been shown that returns per hectare of land in pastoral systems were 6.8 times higher than returns to ranching systems in south-western Uganda (Ocaido et al 2009). In light of these findings, both Karamoja regional development and national livestock policy would benefit from an authoritative, evidence-based re-assessment of the value of that region's pastoral production.

4. In estimating the livestock contribution to agricultural sector GDP we recommend that UBOS consider adopting a production-based approach to calculating the gross value of individual animal products. As demonstrated in this report, the methods used in such calculations are transparent and can be readily adjusted to accommodate fluctuations in UNPS survey data.

¹ 'The census happened during the protected kraal scheme, when the herders who did not want to entrust the management of their animals to the soldiers would have kept well away from government officials. The figure of 2,200,000 is therefore likely to represent an underestimate' (Kratli 2010: 16).

ANNEX

Consultancy terms of reference

Title: The Contribution of Livestock to the National Economies of IGAD Member States - the case of Sudan and Uganda.

Subscriber: Mr. Roy Behnke

Background

The overall objective of the IGAD Livestock Policy Initiative is to enhance the contribution of the livestock sector to sustainable food security and poverty reduction in the IGAD region. The project purpose is to strengthen the capacity in IGAD, its member states, regional organizations, and other stakeholders to formulate and implement livestock sector and related policies that sustainably reduce food insecurity and poverty. The IGAD member states covered by the project are Djibouti, Ethiopia, Kenya, Somalia, Sudan and Uganda.

IGAD LPI activities in Sudan and Uganda are being undertaken in cooperation with their respective Livestock Policy Hubs (LPH) - a multi-stakeholder, advisory groups hosted by the Ministry of Animal Resources and Fisheries (Sudan) and the Ministry of Agriculture, Animal Industry and Fisheries (Uganda). The LPHs has in this context expressly asked IGAD LPI to undertake this study on the contribution of livestock to GDP in both countries and are looking to use the outcome in their engagement with Poverty Eradication Paper development process in the case of Sudan, and with the National Development Plan in Uganda. These are part of their cooperation with IGAD LPI to improve the profile of livestock in the national development strategies. This request is supported by one of the findings of the Mid-Term Review of the IGAD LPI project which established that whereas Output 1 of the IGAD LPI log frame² highlighted the relevance of livestock to GDP, the importance of the contribution of livestock to GDP in the countries was not adequately stressed. Furthermore, an IGAD LPI working paper has emphasised the range of services that livestock provide to the livelihoods of different socioeconomic groups. Many of these services are not marketed and it is therefore suspected that they are not currently reflected in the region's national income accounting. In response to this the IGAD LPI is commissioning studies to look at and articulate the contribution of livestock to GDP in the IGAD member states to attract the increased investment that the sector deserves. The study was initially carried out in Ethiopia with a view to replication in the other IGAD member states. The findings will ultimately be linked to ongoing in-country livestock policy development processes that are supported by the project, especially those related to the better integration of livestock in PRSP (Medium Term Plans) processes and the allocation of national resources. The findings will inform policy hub and working group meetings, and the process of allocating public funds.

The study in is also anticipated to be a valuable resource to the Bureaus of Statistics. For that reason and in order to facilitate access to data, collaboration with the Bureaus through the offices of one of their staff in both countries is also anticipated.

² The first output of the logframe is increased awareness by public, private, and tertiary sector organizations of the potential contribution of livestock and the livestock sector to growth, food security and poverty reduction.

Objective

In collaboration with the Ministry of Animal Resources and Fisheries and the Central Bureau of Statistics (Sudan) and the Ministry of Agriculture, Animal Industry and Fisheries and the Ugandan Bureau of Statistics (Uganda), the consultant will;

1. assess and capture all contributions of livestock to the national economy, irrespective of whether on not current methodologies of GDP calculation cover them. This will involve satellite accounting by looking at the contribution of livestock to other sectors such as manufacturing and transport and add these values to the agricultural GDP estimates.
2. provide a subsequent assessment of how far the contribution of livestock to national economy is reflected in national income accounting in the country. This will require assigning values to the non marketable services that livestock provides and familiarity with the System of National Accounts (SNA). Under this consultancy, the consultant is not required to provide an exhaustive overview of the methodologies adopted by the Bureaus.

Specific Activities

In order to address the objective of the study, and in collaboration with the Ministry of Animal Resources and Fisheries and the Central Bureau of Statistics (Sudan) and the Ministry of Agriculture, Animal Industry and Fisheries and the Ugandan Bureau of Statistics (Uganda), the consultant will;

1. Carry out a situational analysis (mainly through literature review and interviews) on how livestock is currently computed in GDP calculations within national income accounting and how and where livestock contributes to the overall economy in Sudan and in Uganda.
2. Propose a methodology for the internal computation of livestock in GDP that includes assigning values to the non marketable services that livestock provides.
3. Propose an approach for the assessment of the contributions of livestock to the overall economy (satellite accounting).
4. Report the situational analysis findings and the proposed methodology in an inception report to IGAD LPI which will be shared with the LPHs for discussion and comments.
5. Apply the proposed methodology and the approach (ideally in collaboration with a national consultant drawn from the Bureaus of Statistics) in determining the contribution of the livestock sector to national GDP and to the overall economy in both countries.
6. (Ideally in collaboration with a national consultant drawn from the Bureaus of Statistics), report the findings of the study in a draft report to be presented to IGAD LPI and members of the LPHs for comments.
7. Prepare a final report to IGAD LPI containing the findings of the study and a critical assessment of the application of the methodology and the approach in Sudan and in Uganda, together with any pertinent recommendations for how similar studies could be implemented the remaining IGAD Member States.
8. Present findings to members of the Sudan Livestock Policy Hub.
9. Prepare up to two policy briefs for each country, and two policy briefs based on a previous study in Kenya.

Outputs

1. Inception Report presenting the findings of the situational analysis and the proposed methodology and approach for each country.
2. Draft report of findings and the application of the methodology and the approach in Sudan and Uganda.
3. Final report containing the study findings for each country, with an assessment of the application of the methodology and further recommendations for its application elsewhere.

Duration: 192 days and will require an international flight to each of Sudan and Uganda.

Provision has been made for up to 2 national flights in Sudan for the consultancy team if required.

Reporting

The consultant will report to FAO IGAD LPI against agreed outputs and for contractual matters. The final report and its contents will be agreed upon between the consultant and IGAD LPI and the national stakeholders. This work will require the full collaboration of the key departments in charge of national accounts in both Sudan and Uganda.

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