

estimates would now place that contribution at just over 36%. When compared with the imprecision caused by uncertainties regarding the size of the national herd, these are negligible differences, and constitute an endorsement of official estimates, subject to the reservations about data availability stated above. Table 3 summarizes the comparison between official and re-estimated livestock GDP; detailed calculations and data sources are provided in the original report, IGAD LP Working Paper No. 01 – 12 (2012). In addition to providing statistics for Sudan as a whole, Table 3 also distinguishes between the northern and southern Sudanese states, which subsequently became the independent nations of Sudan and South Sudan.

Product	IGAD Estimates Northern states	IGAD Estimates Southern states	IGAD Estimates Sudan total	Official Estimates Sudan total
Cattle milk	9,123,015,552	1,994,428,576	11,107,444,120	-
Camel milk	3,247,597,056	0	3,247,597,056	-
Sheep milk	1,066,348,320	352,611,232	1,418,959,552	-
Goat milk	3,025,558,008	1,290,502,336	4,316,060,344	-
Subtotal milk	16,462,519,596	3,627,542,144	20,090,062,080	14,454,142
Cattle off-take	4,727,715,702	1,999,295,171	6,726,971,873	6,498,999
Camel off-take	740,720,640	0	740,720,640	535,355
Sheep off-take	2,018,928,224	667,803,212	2,686,531,436	3,002,693
Goat off-take	758,305,700	323,443,200	1,081,749,900	1,661,388
Poultry meat, tons	-	-	302,746,300	302,746
Subtotal animal off-take	8,245,671,266	2,990,302,583	11,538,720,149	12,001,048
Eggs	n.a.	n.a.	287,309,800	287,310
Fish	n.a.	n.a.	728,861,300	728,861
Manure for fertilizer	n.a.	n.a.	-	-
Change in stocks	n.a.	n.a.	1,198,176,400	1198176
TOTAL OUTPUT	24,706,191,202	6,617,844,727	33,843,129,729	26,668,537

Uganda

In 2009 official national accounts estimates were produced by the Uganda Bureau of Statistics (UBOS). Both the original official and re-estimated IGAD figures on the contribution of livestock to agricultural GDP in 2009 were based in large measure on official data, but the two calculations produced 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) - was 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 (see Table 4).

The disparity between the official and our revised assessment is due to previously unavailable statistical data on livestock production and to the alternative computational methods. Table 4 summarizes the comparison between official and re-estimated versions of the livestock component of Uganda's agricultural GDP; details are provided in the original report, IGAD LPI Working Paper No. 02 – 12 (2012).

Table 4: Official and IGAD estimates of livestock production in 2009 - gross value and value added in billion Uganda Shillings (US\$)

Product group	Official gross value of output	Official value added	IGAD gross value of output	IGAD value added
Cattle	482	185	978	-
Goats and other animals	1227	343	265	-
Poultry	69	45	89	-
Total	1789	573	1333	1069

Kenya

In 2009 the Kenya National Bureau of Statistics (KNBS), the department responsible for estimating Kenya's GDP, used a commodity flow approach to estimating agricultural GDP. According to this method, calculations of the value of marketed agricultural production were based on the recorded value, quantities and prices for officially marketed agricultural commodities. Non-marketed agriculture production directly consumed by farmers or pastoralists or traded informally was estimated through periodic household budget surveys, and - in the intervals between surveys - was assumed to grow at the same rate as recorded marketed production. In short, the level of overall production was inferred from that portion of the total that is traded through official channels.

When compared to KNBS's commodity flow approach, the production-based procedures followed by IGAD generated a significantly higher estimate of the contribution of ruminant livestock to agricultural GDP - 318.971 billion Ksh versus the official estimate of 127.723 billion Ksh in 2009, an increase of 150%. In the course of arriving at these different results, the two estimation procedures also provided substantially different pictures of the level of livestock product output and the amount of livestock-derived food that was domestically available.

According to the revised estimates, milk is far and away Kenya's most economically important livestock product, with a value of 257.811 billion Ksh in 2009, or about 70% of the total gross value of livestock's contribution to the agricultural sector. Officially recorded milk production was only about one twentieth of total re-estimated milk production in 2009.

Table 5 compares official and revised estimates of livestock sector performance in Kenya; substantiation for the figures in Table 5 can be found in IGAD LPI Working Paper No. 03 – 11 (2011).

Table 5: A comparison of official and revised estimates of livestock sector performance

	Value of cattle and calf off-take, billion Ksh	Value of dairy off-take, billion Ksh	Milk production, Mn. litres	Bovines slaughtered '000 head	Sheep/ goats slaughtered '000 head	GDP livestock, billion Ksh
Official/ recorded	14,627	11,497	407	2,067	5,716	127.723
Production-based estimate	54,826	257,811	7634	2,9152	6,062	353.6531
Official/ recorded as % of production-based estimate	27%	4%	5%	71%	94%	36%

Country comparisons - the diversity of livestock's contribution to national economies in IGAD member countries

Despite lying geographically adjacent to one another, the differences between the livestock sectors of the four study countries are at least as important as the similarities. The following discussion highlights the distinctive features of the livestock sector in each of the study countries.

Ethiopia - animal power

To understand the significance of livestock in Ethiopia we must look beyond GDP and examine the kinds of livestock benefits that are intentionally excluded from national accounts. With few exceptions, estimates of the contribution of livestock to GDP are based on the output of goods - material products such as milk and meat. For accounting reasons the value of livestock services - as draft or pack animals, or as a source of financial security for their owners, for instance - may be included in national accounts but are not ascribed to livestock. Table 6 - which includes all the direct use benefits derived from livestock, both goods and services - corrects this deficiency and, at least for Ethiopia, the results are startling.

Table 6: Direct use benefits derived from ruminants and equines 2009 - billion USD dollars

	Kenya	Ethiopia	Uganda	Sudan
Total direct use benefits	\$4.61	\$9.04	\$0.99	\$18.13
Re-estimated value added	\$4.124	\$3.998	\$0.527	\$14.525
% direct use benefits recognized in national accounts (livestock goods)	89%	44%	53%	80%
% financial services	10%	21%	47%	15%
% ploughing	No estimate	18%	No estimate	No estimate
% transport and haulage, equines and camels	No estimate	16%	No estimate	5% (equines only)

According to Table 6, less than half of the full range of benefits - only 44% of total direct use benefits - that are derived from livestock by Ethiopians are recognized in national accounts as livestock outputs. In 2009, official estimates placed livestock's contribution at about 25% of total agricultural sector GDP, with the bulk of the remaining 75% attributable to crop agriculture. By making animal traction costs explicit, valuing animal draught power increases the costs of cultivation and diminishes the contribution of arable production to GDP. Once ploughing costs are deducted from the value of arable output, crop sector value added in 2009 stood at \$7.495 billion USD versus total direct benefits from livestock of \$9.040 billion USD. In other words, the relative position of crop and livestock agriculture had been reversed. Rather than producing a mere quarter of all agricultural output, livestock were now seen to be contributing more to the national economy than crops.

Kenya - the dominance of milk

Rural or urban, pastoral or farming, Kenyans love their milk, and one product - fluid milk - dominates the Kenyan livestock sector. In terms of value added, milk production is nearly four times more important than ruminant meat production to the Kenyan economy, and relatively more important than milk production in the other IGAD member countries examined in this report (Table 7).

The importance of milk production for Kenya's economy underscores the serious limitations of Kenya's official agricultural statistics, which record an estimated one-twentieth of total national milk output Missed by these statistics is one of Kenya's most recent agricultural success stories - the sustainable intensification of mixed dairy and arable farming on smallholdings in the Kenyan highlands.

Table 7: Gross value of livestock production 2009 in national currencies

	KENYA billion Ksh	ETHIOPIA billion EB	UGANDA billion US\$	SUDAN billion SDG
Cattle milk	197,018	20,738	350,152	11,107
Camel milk	16,190	3,348	3,778	3,248
Goat milk	44,603	6,436	12,978	4,316
Sheep milk	0	0	0	1,419
Subtotal milk off-take	257,811 (70%)	30,520 (59%)	366,908 (28%)	20,090 (59%)
Cattle off-take	53,960	8,103	627,374	6,727
Camel off-take	1,948	0,145	0,484	,741
Sheep off-take	3,699	2,254	35,380	2,687
Goat off-take	7,540	2,255	181,913	1,082

table continued

Subtotal ruminant off-take	67,147 (18%)	12,757 (25%)	845,151 (83%)	11,237 (39%)
Egg production	10,305	1,656	89,000	,287
Chicken off-take	4,616	1,051		,303
Pig off-take	1,506	-	30,893	0
Subtotal non-ruminant production	16,427 (4%)	2,707 (5%)	119,893 (9%)	,590 (2%)
Manure	27,829	3,429	No estimate	No estimate
Change in stocks	No estimate	1,384	No estimate	1,198
Other	0	1,188 (wool, honey and wax)	1,355 (blood)	,729 (fish)
TOTAL	369,214 billion Ksh or \$4,124 USD 100%	51,98 billion EB or \$3,998 USD 100%	1,333,307 billion US\$ or \$0,527 USD 100%	33,843 billion SDG or \$14,525 USD 100%

Uganda - pastoralism as a regional specialization

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.

In 2009 just under half - about 47% - of the direct benefits derived by Ugandan livestock owners from their animals were attributable to the financially related livelihood services provided by livestock (Table 6). 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.

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, these services become more affordable, and 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. 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 to 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.

Sudan - pastoralism as the dominant component of domestic agriculture

The most prominent characteristic of livestock keeping in Sudan is the sheer size and diverse productivity of the enterprise. In terms of the value added to agricultural GDP, together Sudan and South Sudan produced more than the combined livestock output of the three other countries covered in this report - Uganda, Kenya and Ethiopia.

GDP estimates also reveal the very significant contribution made by livestock to combined Sudan and South Sudan domestic economy. Sudan's agricultural sector GDP includes crop, livestock, fisheries and forest production. Using official statistics, livestock has consistently provided more than 60% of the estimated value added to this sector in recent years, and is a substantially more important contributor