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The Contribution of Livestock to the Kenyan Economy

Livestock specialists frequently argue that livestock production is underrepresented in the GDP estimates of African nations. With respect to Kenya this argument has been confirmed.

IGAD (Intergovernmental Authority on Development) and the Kenyan National Bureau of Statistics (KNBS) completed in 2011 a joint review of the importance of livestock to the Kenyan economy. The study (IGAD LPI Working Paper No. 03-11) demonstrated that livestock's contribution to Kenyan agricultural gross domestic product (GDP) was more than two and a half times larger than the official estimate for 2009, the most recent year for which there was complete data. This increase over official estimates means that the livestock contribution to agricultural GDP was only slightly less than that from crops and horticulture, about $4.54 billion US dollars for livestock in 2009 versus $5.25 billion US dollars for arable agriculture.

Kenya's livestock were underappreciated because the size of the national herd was not known, and no attempt to enumerate it had been made for decades. Estimates of the livestock sector were also based on official sales records, which missed production that was traded informally or directly consumed by livestock owning households. If these shortcomings are remedied, the importance of livestock takes on new economic significance. Agriculture and forestry are by far Kenya's most important economic sector in terms of domestic production, and it would now appear that livestock provide about 45% of the output from this sector.

This revised estimate has at least two far-reaching implications. First, government should give more attention to accurately monitoring the livestock sector and, secondly, that government should now place a higher priority on livestock and livestock producers in designing future agricultural policies.

The estimation of agricultural GDP in Kenya

The Kenya National Bureau of Statistics (KNBS), which is responsible for calculating Kenya's national accounts, uses a commodity flow approach to estimating agricultural GDP. According to this method, calculations of the value of marketed agricultural production are based on the value and quantity of officially recorded agricultural sales. Agriculture output that is consumed by farmers or pastoralists or traded informally is estimated through surveys, and this production is assumed to grow at the same rate as that which is officially sold. In short, the level of overall production is inferred from that portion of the total that is traded through official channels.

This approach may work well for cash crops such as pyrethrum, sisal, and sugar cane, or for heavily exported crops such as coffee, tea, or cut flowers – all of which economically important for Kenya. These crops are unlikely to be sold or consumed in large quantities outside of formal channels and marketed output will accurately reflect total output.

The commodity approach has limitations, however, when applied to livestock and livestock products, which in Kenya have important subsistence uses for large numbers of rural producers. In 2011, surveys to estimate subsistence production were out of date (from 1977), excluded pastoralists, and were based on livestock sales and slaughter statistics that did not include small markets or cover North Eastern Province.

These considerations suggested the need to cross-check official figures using techniques that estimate the amount of output produced on average by different kinds of livestock. The wealth of scientific research that has been carried out on livestock production made accurate estimates of this kind feasible for Kenya. The opportunity to carry out these calculations was also provided by a comprehensive enumeration of Kenya's livestock population, based on questions attached to the human population census of 2009 on the number of livestock kept by households. The new census data revealed that the old estimates of ruminant livestock populations for the last decade were roughly half of the new census figures for camel, sheep and goat populations, and about three quarters of the census estimate for cattle (Table 1).

Table 1: Kenyan livestock populations – old and new estimates

	National MLD 2008 estimates	National 2009 population census	Percentage underestimate
Cattle	13,522,500	17,467,774	23
Sheep	9,907,300	17,129,606	42
Goats	14,478,300	27,740,153	48
Camels	1,132,500	2,971,111	62
Donkeys	786,800	1,832,519	57
Pigs	330,020	334,689	1
Bee hives	-	1,842,496	-
Chicken indigenous		25,756,487	
Chicken commercial	29,615,000	6,071,042	7

The contribution of livestock to agricultural GDP

Based on new livestock population and output estimates, Table 2 summarizes the gross value of the goods derived from livestock in Kenya in 2009. The re-estimated value of livestock production is 369.214 billion Kenyan shillings (Ksh) (Table 2). According the KNBS the costs of the inputs used in livestock production totalled 50.243 billion Ksh in 2009. Deducting these intermediate costs from the gross value of production gives a figure of 318.971 billion Ksh, the value added by livestock to the agricultural sector of the Kenyan economy in 2009. This compares to the official estimate of livestock GDP at 127.723 billion Ksh in 2009, an increase of 150%.

Table 2 also highlights two distinctive features of the livestock economy of Kenya:

Milk is far and away Kenya's most economically important livestock product, providing a gross value of 257.811 billion Ksh in 2009, or about 70% of the total gross value of livestock's contribution to the agricultural sector. In terms of its contribution to agricultural GDP, milk is about four times more important than meat.

Cattle are Kenya's most important source of red meat, supplying by value about 80% of the nation's ruminant offtake for slaughter. Much of this offtake is imported. More than 80% of the beef consumed in Kenya is produced by pastoralists, either domestically or in neighbouring countries and then imported on the hoof, often unofficially.

Table 2 Estimated Gross Value of Livestock Production in 2009

Product	Billion Ksh
Cattle milk	197.018
Camel milk	16.190
Goat milk	44.603
Subtotal estimated milk offtake	**257.811**
Cattle offtake	53.960
Camel offtake	1.948
Sheep offtake	3.699
Goat offtake	7.540
Subtotal estimated ruminant offtake	**67.147**
Egg production	10.305
Chicken offtake	4.616
Pig offtake	1.506
Subtotal non-ruminant production	**16.427**
Manure for fertilizer	27.829
Change in stocks	No estimate
TOTAL PRODUCT OUTPUT	**369.214**

Table 3 compares the 'commodity flow' and 'production' approaches to estimating livestock sector performance. It is clear from this comparison that the results of the two estimation techniques are incomparable: By referring exclusively to formally marketed production, official statistics always represent a fraction of total estimated output using a production-based approach.

What is notable is the small proportion of all livestock production that is captured in official statistics – less than a third of the value of bovine offtake and less than a twentieth of the value of national milk production. Within their limits, the official recorded estimates of the value of livestock production may be reasonably accurate, but because only a small portion of Kenya's livestock production is exchanged through official channels, official figures give a very partial impression of the size and organization of the livestock sector. These figures would also appear to provide an unreliable basis upon which to estimate the contribution of livestock to agricultural GDP. GDP estimates are obliged to include the value of un-marketed and informally marketed livestock production. At 40% of the production-based estimate of livestock's total contribution to agricultural production, it is doubtful that an approach based on officially recorded sales figures is fit to achieve this purpose.

Table 3: A comparison of official and revised estimates of livestock sector performance

	Value of cattle and calves offtake, billion Ksh	Value dairy offtake billion Ksh	Milk production, Mn. Litres	Bovines slaughter '000 head	Sheep/ goats slaughtered '000 head	GDP livestock billion Ksh
Official/ recorded	14.627	11.497	407	2,057	5,716	127.723
Production-based estimate	53.960	257.811	7634	2,8751	6,062	318.971
Official/ recorded as % of production-based estimate	27%	4%	5%	72%	94%	40%

The direct use benefits of livestock to the Kenyan economy

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.

Rural Kenyans derive a range of financial benefits from livestock keeping, including the provision of credit, insurance, and as a means of sharing risk. The credit benefits of livestock derive from the ability of livestock owners to 'cash in' their animals for particular purposes at a time that they choose. 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 in rural areas to obtain funds comparable to those produced by liquidating a part of the herd. Employing this 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. Interest rates in rural Kenya in 2009 were currently running at about 25% per annum in institutionalized channels, but about half of lending in rural Kenya is done privately by neighbours, friends and kin, resulting in low rural interest rates averaging 6.3% per annum. In this case the financial value of livestock offtake is about 4.230 billion Ksh.

Part of the insurance 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, so livestock ownership functions as a kind of 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. Health insurance provided by a government-supported national scheme, the National Hospital Insurance Fund, annually costs 0.0048% of the coverage provided. Valued at a comparable insurance premium, livestock in Kenya provide 2.247 billion Ksh of insurance value to their owners.

For pastoralists in Kenya, 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 pastoralists in time of need. These collective schemes for sharing risk are based on the gifting and loaning of livestock within pastoral communities, with large herd owners donating some of their animals and less well-off pastoralists drawing support in the form of livestock received as gifts or on loan. Recent research suggests that about 10.5% of pastoral animals in Kenya are involved in livestock sharing networks of this kind. Assuming that the total capital value of pastoral livestock in Kenya is 295.270 billion Ksh, the collective insurance value of pastoral herds can be estimated at 31.003 billion Ksh in 2009.

There is insufficient evidence to assign a monetary value to the benefits derived from animal power. These benefits include the use of animal draught power (principally oxen) for cultivation, and the use of equines and camels for transport and haulage. Descriptive studies document the economic and practical value of working animals, but it is not possible to extrapolate from isolated studies of particular communities to an estimate of the national significance of their services, and there is no current information on the commercial rates charged for renting various forms of animal power, information which is needed to establish the imputed monetary value of work animals that are kept by households for their own use.

The direct use value of livestock to the national economy in 2009 is estimated at 356.451 billion Ksh, of which 318.971 billion Ksh represents the value of the goods produced by livestock, and constitutes the livestock contribution to agricultural sector GDP (Table 4). An additional 37.246 billion Ksh in direct use benefits is derived from the value of financial services – credit, insurance and risk pooling – that are provided by livestock for their owners, but are excluded from conventional GDP calculations. In comparative terms, in Ethiopia livestock-based financial services were equivalent to more than half of the value of the livestock contribution to agricultural GDP. In Kenya these same services are equivalent to a little over 11% of agricultural sector GDP from livestock. The decline in the relative importance of livestock-based financial services can be attributed to the better penetration of rural areas by formal financial services in Kenya as compared to Ethiopia. Improved financial services have lowered the costs of obtaining credit and insurance in Kenya, and thereby diminished the imputed value of comparable services provided by livestock. A major shortcoming of the present analysis is our inability to assign a national monetary value to any form of animal power usage in Kenya.

Table 4: Direct use benefits derived from ruminants and equines, 2009 in billion Ksh

Type of benefit	Agricultural GDP	Services not in current GDP estimates
Value added livestock products (slaughter animals, milk, eggs, manure for fertilizer)	318.971	
Traction power for ploughing		No estimate
Benefit from financing		4.230
Benefit from self-insurance		2.247
Benefit from risk pooling/stock sharing		31.003
Transport and haulage by equines and camels		No estimate
Sub-totals	318.971	37.480
Total economic benefits	356.451	

The role of livestock in household consumption and expenditure

Nationally, 11.4% of household consumption expenditure (including purchased and the monetary value of own produce, own stock and gifts) is spent of livestock-derived food items, 13.1% in rural and 9.7 % in urban Kenya. In rural Kenya 53.9% of food is purchased, while in urban Kenya 79.9% is purchased.

According to the national census, Kenya had a population of 38,610,097 people in 2009. Based on this population estimate, Table 5 uses the new milk and meat production estimates to calculate the red meat (including offal) available from ruminants (cattle, sheep, goats and camels) and pigs for consumption per capita in 2009.

According to Table 5, Kenyans on average have available meat and offal for consumption per person of 11.77 kg from beef, 2.94 kg from small stock, 0.54 from camels, 0.26 from pigs, and 0.54 from chickens. These figures are remarkably close to the estimates of meat supply in the 'Food Balance Sheet' for 2009, at 13 kg of beef, 2.3 kg of mutton and goat meat, and 0.9 kg of 'other meat', per caput per year. This outcome is surprising given the discrepancies between current official estimates of livestock production and the higher estimates of livestock product output in our revised estimates.

Table 5: Ruminant, poultry and pig meat for consumption (includes live animal imports), 2009

Product	Calculations	Total consumption (mt)	Per Capita (kg/year)
Beef	Small holders/pastoral/imports 2,839,677 head * 125 kg/head	354,960	
	Ranches 36,000 * 240 kg/head	8,640	
Total beef		363,600	9.42
Beef Offal	25% of meat production	90,900	
Total beef and offal		454,500	11.77
Sheep and goat meat	6,061,509 * 15 kg/head	90,923	2.35
Sheep and goat offal	25% of meat production	22,731	
Total sheep and goat meat and offal		113,654	2.94
Camel meat	50,509 * 330 kg/head	16,670	.43
Camel offal	25% of meat production	4,167	
Total Camel meat and offal		20,837	.54
Ruminant total, meat and offal		588,991	15.25
Pig meat	167,344 head * 60 kg dressed weight	10,041	.26
Chicken meat	Indigenous and culled commercial layers 1.3 kg dressed weight; broilers 1.5 kg dressed weight	20,889	.54

The revised milk production estimates are:

Cattle	5.788 billion litres – 76% of national total
Camels	0.553 billion litres - 7% of national total
Sheep and goats	1.293 billion litres – 17% of national total
Total milk production	**7.634 billion litres**

Using the 2009 census population estimate of 38,610,097 people, per capita fluid milk available for consumption or for conversion into processed dairy products for consumption is 198 litres per person per year. This figure is approximately ten times higher than the food balance sheet estimate of milk supply at 17.3 kg and butter/ghee at 0.1 kg per caput per year.

In sum, our estimates of domestic meat availability broadly agree with official figures, but our estimates for the availability of milk and dairy products are much higher than official figures.

In comparison to official assessments, our estimates of livestock production follow a similar pattern: The new estimates roughly agree with official small stock slaughter figures, exceed official estimates of cattle slaughters, but are about twenty times larger than official milk production figures. Since milk is about four times more important than meat in terms of its contribution to agricultural GDP, any inaccuracies in the calculation of milk output have a proportionately large impact on the estimated performance of the entire livestock sector. Without better documentation of the value and volume of milk production and consumption, official statistics on the livestock sector lack authority and credibility.

Recommendations

- Despite the data limitations discussed in the full report, KNBS should consider adopting as standard practice the production approach to estimating livestock GDP that is presented in this briefing paper.
- The Ministry of Livestock Development (MOLD) currently has little authoritative, quantified, national-level data on Kenya's most valuable livestock commodity – milk – and the Ministry should seek to remedy this deficiency. Dairy production and marketing are topics on which numerous Kenyans have conducted sophisticated and precise scientific research, and there is a large pool of national talent to engage in improving the Ministry's field monitoring, data analysis, and reporting skills. Until remedial action has been taken, the Ministry's lack of authoritative and comprehensive data impairs its ability to contribute to evidence-based discussions of national dairy policy.
- With technical support from interested research institutes and Kenyan universities, MOLD and KNBS should undertake a national survey of the value of animal power to the Kenyan economy and of the role of animal power in sustaining both rural and urban livelihoods. This survey should include all forms of animal traction, transport and haulage by all species of working animals – cattle, equines and camels – in rural and urban areas and in all economic sectors – agriculture, manufacturing and services. As well as the commercial provision of animal power, the survey should assess the monetary value of the services that working animals directly provide for their owners.
- The information on livestock numbers provided by the 2009 census revealed the limitations of the procedures used by the Ministry of Livestock Development (MOLD) to estimate livestock populations, a weakness that scientific researchers had recognized but could not conclusively demonstrate. Livestock researchers have noted the 'need for better estimation methods' for enumerating livestock populations. The next human population census may not contain questions on livestock. It is essential that MOLD develop affordable survey techniques to reliably estimate the country's livestock numbers, or subcontract this responsibility to a qualified national research institute or university.

Note: Data sources that substantiate the calculations in this briefing paper are given in the original report: The Contribution of Livestock to the Kenyan Economy (IGAD LPI Working Paper No. 03 – 11) 2011, by Roy Behnke and David Muthami

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For more information, please contact:
IGAD ICPALD - Acting Director
Box 47824, 00100, Nairobi, Kenya,
E-mail: muchina.munyua@igad.int