**Title:** The role of livestock in the economy of Kenya: policy analysis using a dynamic computable general equilibrium model

**Author:** Ermias Engeda

**Affiliation:**

Ethiopian Development Research Institute
Addis Ababa Ethiopia
POBox 2479
ermias.engeda@yahoo.com

**ABSTRACT**
The livestock sector has important role in the overall economy and livelihoods of a large proportion of rural as well as urban households in Kenya. The contribution of the sector to Kenya's economy is often given as 12% of the country's GDP and 42% of agricultural GDP (SNV, 2008). Besides, it is a significant source of foreign exchange and has strong linkages with the other activities of the economy.

However, the importance of livestock sector has often been underestimated by policymakers as well as researchers (R. Behnke and David M., 2011). In fact, this phenomenon is not unique for Kenya. A recent and similar study on the Ethiopian economy revealed that the direct and indirect roles of the livestock sector on the wider economy have been substantially underestimated (A. Gelan et al, 2012). Researchers neglect the livestock sector mainly for methodological reasons. This study set out to overcome these methodological reasons and the shortcomings in existing computable general equilibrium (CGE) modeling. The major significance of this study is thus, it gives the already existing dynamic CGE model the ability to better treat the livestock sector by capturing its complete natural picture through coupling of the stock - flow feature of the sector into the model.

The model used in this study is a recursive dynamic extension of the standard CGE model of the International Food Policy Research Institute (IFPRI) modified to fit the Kenyan economy, documented in Thurlow and Benin (2008). The study is intended to inform policymakers regarding the economy wide direct and indirect effects of enhancing productivity for the livestock sector in Kenya. Total of four simulations are ran to realistically shock Total Factor Productivity (TFP) of cereal, livestock and other agriculture sub sectors separately.

Simulation results indicate that with similar weighted average TFP shock applied, agricultural GDP and overall GDP growth levels achieved in the livestock TFP shock scenario are significantly important to show that the sector has strong growth potential somewhat in contrast to previous thoughts that emphasized cereal-led growth as the optimal strategy. Improving productivity in the livestock sector has significantly strong aggregate economic efficiency gains measured by growth in value-added and by improvements in the external sector: a smaller real exchange rate appreciation and larger export earnings as compared to accelerated productivity growth in the cereal sector. Furthermore, although livestock is not the predominant factor owned by poor households, the accelerated productivity growth in livestock activities brings about higher returns to land and similar returns to labour than in the accelerated cereal sector scenario. Since these are the predominant factors of the poor, investing more in enhancing livestock activities' growth has huge implication in poverty reduction and narrowing the income gap. On the other hand, livestock factors enjoy larger growth of returns in the CEREAL simulation with equally growing returns to labour.

Importantly, as factors are dynamically re-allocated between agricultural activities, the inefficiency of strategies focusing on cereal sector development alone was highlighted. Thus it is better to give equal policy priority emphasis to the livestock sector and plan livestock – cereal sub-sectors joint growth instead of cereal sub-sector growth alone. Thus, balanced agricultural growth, in which productivity gains are more evenly distributed across sub-sectors, is preferable. In Kenya, this means investing more in enhancing the productivity of livestock as it is the case for cereal sub-sector.

**Keywords:** Computable General Equilibrium, Total factor productivity, Herd dynamics

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