



Integrating Livestock into Agricultural Statistics

The AU-IBAR, FAO, ILRI, WB Data Innovation Project

Ugo Pica-Ciamarra¹, Derek Baker², Berhanu Bedane³, Thomas Emwanu⁴ and Nancy Morgan⁵

¹FAO, Rome; ²ILRI, Nairobi; ³AU-IBAR, Nairobi; ⁴UBOS, Kampala; ⁵FAO-WB, Washington D.C.

October 2010



Joint paper of the World Bank, FAO, AU-IBAR, ILRI with support from the Gates Foundation



ABSTRACT

The growing demand for food of animal origin developing countries, stimulated by population growth, gains in real per capita income and urbanization, represents an opportunity for some livestock dependent poor to escape poverty. However, because of the dearth of livestock-related data, the linkages between livestock, economic development and poverty reduction remain to a large extent unclear, which constrains the design, implementation and monitoring of pro-poor livestock-related policies and investments. This paper provides an introduction to the Gates-funded *Livestock in Africa: Improving Data for Better Policies* Project being implemented by AU-IBAR, FAO, ILRI and WB. This project has the overarching objective to assist African governments in better collecting and analyzing data which support public and private investments in the livestock sector that benefit the less well-to-do.

A variety of livestock-related data can be collected at country level, but the current limited understanding of the livestock-poverty interface makes it difficult to identify priority data to gather and process for formulating policies and investments which promote equitable growth of the livestock sector. In addition, the role and mandate of the public sector in providing specific information is often unclear, and stakeholders tend to look for data and indicators which support specific investments or government objectives – such as, for example, the number of livestock to be vaccinated or prices for live animals in major regional markets – often disregarding the broader livestock-poverty interface. There are also technical difficulties associated with ‘measuring livestock’, due to the existence of hundreds of breeds; regular and irregular herd mortality and reproduction rate; livestock movements; impact of livestock age and animal diseases on productivity; and others.

The *Livestock in Africa: Improving Data for Better Policies* Project will inventory existing livestock-poverty data and data sources in Uganda, Tanzania and a West African country to be decided, and establish communications amongst users and suppliers of livestock statistics to pilot new methods for collection, validation and analysis of data and dissemination of indicators, which facilitate both public and private investments in the livestock sector. In developing new methods and approaches, the Project will (a) combine production, value chain and consumption data to better understand the livestock-poverty linkages; (b) identify key indicators that provide insights not only on production and productivity but also on other livelihood-supporting services provided by livestock; (c) take a demand-driven approach and design a targeted communication and advocacy strategy to support the mainstreaming of key livestock data / indicators into national statistical systems. What matters, in fact, is not the one-off generation and analysis of data, but the continuous availability of livestock statistics to identify good investment opportunities, either for the public and the private sector.

KEYWORDS – livestock, statistics, household survey, rapid appraisal, constraint analysis

1. INTRODUCTION

Limited information is a major constraint to economic development: it makes it difficult for public and private actors to design and implement effective and equitable investments, and encourages moral hazard behaviours that create economic inefficiencies. This is overwhelmingly the case for agriculture, where output is generated both by a vector of inputs directly controlled by the producer and by a series of state-contingent uncontrollable variables (e.g. mean temperature), which may encourage moral hazards (Hayami and Otsuka, 1993).

Most countries in the developing world, where growth in agriculture is critical for reducing poverty level, 'lack the capacity to produce and report even the minimum set of agricultural data necessary to monitor national trends or inform the international development debate' (UN, 2010, p.11; Chilonda and Otte, 2006; Perry and Sones, 2010). In the last decade, a number of initiatives have been thus launched to support the collection and analysis of agricultural data and statistics, including the *Partnership in Statistics for Development in the 21st Century* (PARIS21), the *Wye Group on Statistics on Rural Development and Agriculture Household Income* and the *UN Global Strategy to Improve Agricultural and Rural Statistics* (UN, 2010).

This paper introduces to the *Livestock in Africa: Improving Data for Better Policies* Project (henceforth the Livestock Data Project), jointly implemented by the Africa-Union Inter-African Bureau for Animal Resources (AU-IBAR), the Food and Agriculture Organization (FAO), the International Livestock Research Institute (ILRI) and the World Bank (WB). The project, launched in 2010, has the overarching objective to assist African governments in better collecting and analyzing data which support public and private investments in the livestock sector that benefit the poor, and to integrate key livestock data into national statistical systems, which only can ensure the continuous availability of livestock statistics necessary to formulate and implement effective and equitable investments in the sector. It builds on the evidence that there are limited statistics for livestock-related poverty-focused investments (e.g. AU, 2010; AU-IBAR, 2009) and that, because of the nature of both livestock and livestock production systems, collection and analyses of sector data requires *ad hoc* approaches and techniques (e.g. FAO, 1992; Hurley, 1957).

The paper is organized as follows: the next section presents a snapshot of the current availability of livestock data in Africa, and in the developing world in general, with the aim to identify major issues and shortcomings. Section three and four present the Livestock Data Project, and how it attempts to identify key livestock-poverty data and statistics and to facilitate their integration into the national statistical system. Section five concludes with a review of the project's challenges.

2. LIVESTOCK DATA FOR DEVELOPMENT IN AFRICA: AVAILABILITY AND ISSUES

There is broad consensus that available data are insufficient to formulate and implement public and private sector investments contributing to an efficient and equitable development of the African livestock sector, and that greater investments are needed in livestock data collection and analysis (e.g. AU, 2010, p.1; AU-IBAR, 2009; Perry and Sones, 2010). However, it is unclear what and how data should be collected and analyzed. This is a critical question as, given resource and technical constraints, only a limited set of key data / indicators can be regularly collected and included in the national statistical system. A review of existing livestock related data / databases for the African continent may help identify what data are available and critical gaps in current statistics.

- There exists a variety of livestock-related indicators for African countries, including number of animals and quantity of production, level of consumption and trade flows of a number of livestock products, both raw and processed (e.g. FAOSTAT, 2010).
- Detailed livestock data / statistics tend to look at technical issues, with a focus on breeds, feed and, particularly, animal diseases (trans-boundary diseases and zoonoses) which may cause major economic and social losses (e.g. the World Animal Health Information System (WAHIS) of the World Organization for Animal Health).
- Household surveys rarely look at livestock in detail (the few livestock-related questions, if any, focus on the number of animals owned and value of production) and certainly do not provide detailed information on non-farm and off-farm livestock related activities (e.g. on livestock trade).
- All possible sources of livestock data and statistics, such as agricultural censuses, livestock censuses, periodic and *ad-hoc* sample surveys, household income or expenditure surveys, find it difficult to provide 'good' information on pastoral production systems (see box 1).
- At country level, availability of livestock data and statistics varies widely. For instance, whereas the Uganda 2008 Livestock Census provides comprehensive sector's statistics at district level (MAAIF and UBOS, 2009), it is difficult to get such detailed information for other countries, such as Chad and Mauritania (Dokalyo, 2009; Malainine, 2001).
- Livestock data are rarely collected on a regular basis and, in most cases, current statistics are based on data extrapolations, though extrapolation models are often unable to take into adequate account the rapid changes which are occurring in the livestock sector (e.g. changed consumption patterns; new epidemics).
- Quality of data is mixed, in terms of timeliness, completeness, comparability and accuracy, and data collection and analysis are rarely, if ever, integrated into the national framework of agricultural statistics.

In conclusion, current livestock data are useful to depict major trends, make general cross-country analyses and support investments in some specific livestock domain, such as to mitigate the impact of animal diseases. They give little insights on how livestock contribute to the national economy and to household livelihoods and, hence, on how to design investments which promote a pro-poor development of the sector.

Box 1. Issues in measuring pastoral economies

Lack of panel data on pastoral production systems thwarts the possibilities of formulating investments which promote an efficient use of resources available in arid and semi-arid lands, including livestock. Whereas several studies have documented pastoralist production systems and pastoralist livelihoods in detail (e.g. Niamir-Fuller, 1999), the tools these studies use are time and cost intensive and not appropriate for monitoring trends in the pastoral economy on a regular basis. More practical ways are to be developed if statistical authorities are to collect, process and disseminate data and statistics on pastoral production systems.

There are at least three key issues associated with measuring pastoral economies. First is that there is no standard definition of pastoralism, which may be identified on the basis of economic parameters (how much do livestock contribute to household income?), agro-ecological parameters (where do the household lives?), ethnic dimensions (to what tribe does the household belong to?), by exclusion (e.g. by defining crop and mixed crop-livestock farmers) or by combination of more than one variable. Each of the different approaches has its own advantages and weaknesses: for instance, using an economic definition could produce high variability in the number of pastoralists

across the years because of rapidly changing livelihood strategies associated with weather fluctuations. The second issue relates to pastoralists' regular or opportunistic movements along the year, which makes it difficult to set up a system of standard collection of data. Trekking routes may change from year to year (nomads may even change route after being informed of survey operations) and counting all animals that pass along a route is difficult; aerial or satellite surveys are powerful instruments to measure livestock population in vast arid and semi-arid areas, but they do produce little information on the pastoral economy, i.e. on their own they are a blunt tool for designing programmes and investments; water points, which have been used as sampling units in some countries (e.g. Southern Ethiopia and Iran), are often unknown to statistical authorities and present high seasonal variability, both in numbers and capacity of watering livestock, i.e. livestock data collected at water points may result extremely variable across the years. The third issue is about interpreting data on pastoral peoples, so as to come out with investment options which are consistent with their livelihood system. In effect, given the multiple roles that livestock play in pastoral economies and the oftentimes opportunistic use of markets by pastoral peoples, using standard production or profit functions to identify key constraints affecting their livelihoods may lead to biased conclusions and policy indications (Blench, 1999; FAO, 1992; Randall, 2006).

3. IDENTIFYING CORE LIVESTOCK DATA AND STATISTICS

The *Livestock in Africa: Improving Data for Better Policies* Project is a three-year (2010-2012) project funded by the Bill & Melinda Gates Foundation, and jointly implemented by the African Union Inter-African Bureau for Animal Resources (AU-IBAR), the Food and Agriculture Organization (FAO), the International Livestock Research Institute (ILRI) and the World Bank (WB), in close cooperation with national governments and institutes. It aims to first pilot and develop methodologies for identifying, collecting and analyzing livestock data, which promote pro-poor investments in Uganda, Tanzania and a West African country to be decided (Niger or Mali), and then to support their institutionalization into the national framework of agricultural statistics, which only can ensure the continuous design and implementation of efficient and equitable investments in the livestock sector. In order to identify core livestock-data relevant for the livelihoods of the poor and, hence, for promoting investments in the livestock sector that benefit the less well-to-do, the Project makes use of different databases and methods of collecting and analyzing data and indicators.

3.1 Household level data and statistics

Large scale national household surveys are the basis for documenting poverty in developing countries and are possibly the best source of data to examine the livestock-poverty linkages at micro-level (e.g. Chen and Ravallion, 2008; Deaton, 1997). Current surveys, however, rarely include more than a few livestock-related questions and are not particularly useful for looking at the livestock-poverty interface. As a consequence, there is partial appreciation of the many ways livestock can contribute to household livelihoods and of the data that should be collected to formulate pro-poor investments in the sector.

The Livestock Data Project will use (i) the FAO Rural Income Generating Activities (RIGA) database, comprising 32 households surveys covering 18 countries in Africa, Asia, Eastern Europe and Latin America (Davis *et al.*, 2010) and (ii) household level data produced by the World Bank's Living Standards Measurement Study - Integrated Survey on Agriculture (LSMS-ISA) Project in seven African countries (Carletto, 2010; <http://go.worldbank.org/TNOUO6ZE40>), including some

with a specific focus on livestock (e.g. see box 2), to make analyses of the livestock-poverty linkages at household level and identify some key data / indicators that best measure the contribution of farm animals to household livelihoods.

Box 2. Livestock questions in household surveys

The Livestock Data Project will test and administer at least two targeted household survey modules to collect livestock data at the level of production and along the value chain, for example by including in the current LSMS questionnaires questions on the consumption of pasteurized milk and on preferred retail market format, or by oversampling purposely selected households, such as dairy producers, urban consumers or pastoralists. This will allow, on the one hand, getting micro information on some marketing and consumption issues – such as on wholesaler price, level of processing; and retail formats preferred by consumers – and, on the other, exploring with new methodologies to better measure some key livestock parameters – such as animal breeds, milk production and even the pastoral economy.

3.2 Market and supply chain indicators

Nationally representative household surveys provide enough information to draw inferences on agricultural production activities (e.g. data on land ownership and land area, number of parcels, crops grown and livestock owned, use of fertilizers and pesticides, use of plows or tractors are often available) but offer little information on the rural off-farm economy (e.g. on traders, processors, wholesalers and retailers) and on the consumption of food of animal origin, whose appreciation is critical for designing and implementing pro-poor livestock sector investments¹ (Barrett *et al.*, 2001; Jabbar *et al.*, 2010; Rich *et al.*, 2009).

The Livestock Data Project will use rapid rural appraisal techniques – including literature review, analysis of secondary sources, semi-structured interviews with key informants, direct observation, mapping (see Chambers, 1981) – to identify consumption trends and market opportunities for a variety of livestock products in the project countries and to describe those value chains linking smallholders to selected high-potential markets. The ultimate objective is to identify data / indicators for product and value chain characteristics (e.g. freshness; retail format; trading patterns) that facilitate / hamper smallholders participation in lucrative livestock markets.

3.3 Core data and indicators

If combined, household surveys and demand / value chain analyses could be a powerful tool to identify core livestock data / indicators which are relevant to design investments in the sector that benefit the poor. Constraints analysis methodologies (e.g. Devendra, 2007; Gelan and Muriithi, 2010; Nordlund *et al.*, 2007) will be used to analyze household level and market / supply chain data to identify those constraints that bind the most smallholder livestock keepers, both at the farm level and beyond the farm-gate (e.g. technology inefficiencies, unproductive breeds, limited information on output price, inability to meet some hygiene standards, etc.). A systematization and ranking of constraints would allow identifying a core set of livestock data to collect and indicators to disseminate to facilitate the design and implementation of pro-poor investments in the sector, either from the public and the private sector.

¹ Note that the literature which looks at market access issues using LSMS data use household-related variables to identify factors affecting farmers' participation to market, such as household size, membership to cooperatives, access to motor transport and ethnicity (e.g. Baldwin *et al.*, 2007; Ha and Shively, 2008; Rios *et al.*, 2009).

4. INTEGRATING CORE LIVESTOCK DATA INTO AGRICULTURAL STATISTICS

From a technical perspective, the Livestock Data Project will be innovative in its attempts to focus on livestock data which are relevant to poverty reduction, and to combine micro data at the production, supply chain and demand level to identify key indicators that, in the pilot countries, will contribute to identify potential pro-poor investment options, both for the public and private sector. From a developmental perspective, however, what matters is not the one-off generation and analysis of data, but the continuous availability of livestock statistics to identify good investment opportunities. A major challenge confronting the Livestock Data Project, therefore, concerns the integration of key livestock data into national statistical systems.

The Livestock Data Project will make an inventory of available data / databases in each pilot country to investigate if and where there are opportunities to integrate relevant livestock statistics into the components of the national statistical systems. In Uganda, for instance, the National Genetic Resource Centre and Data Bank may start collecting data on given cattle breeds on a regular basis; the Livestock Marketing Information System of Tanzania could be improved to also include data on processed livestock products; etc.

There could be, however, limited incentives for the institutionalization of livestock-poverty data into national statistical systems, as in no country there is one authority which is overall responsible for 'poverty reduction', and the livestock sector is largely in the hands of technical Ministries that primarily look for those data / indicators necessary to accomplish their technical tasks. For instance, the Department for Animal Health may be just interested in estimates of the number of animals to budget its vaccination campaigns; the Department of Trade may be just interested in data on imported and exported quantities to better assess earnings from import tariffs; etc. Communication and advocacy will be therefore critical elements for Project's success. In particular, the Project will highlight the potential of livestock as a tool for poverty reduction and economic growth by disseminating evidence that both public and private investments in the sector, if based on appropriate data, may generate handsome returns. In addition, the various methodologies of data collection and analyses will be documented in a sourcebook, which will provide guidelines for national governments and other livestock stakeholders to first identify core livestock statistics and then include them into national / agricultural statistical systems, both in the Project countries and others. In any case, the full and effective integration of livestock data into the national statistical system depends on the development of a master sample frame for agriculture, which includes livestock, and that concepts, definitions, classifications and quality dimensions become standardized across all livestock data collection exercises, thereby ensuring comparability and joint use of data from different sources (UN, 2010).

5. CONCLUSIONS AND CHALLENGES

Lack or insufficient information on livestock reduce the investments incentives in the sector for both public and private sector actors, leaving untapped the many potentials of livestock sector growth to contribute to economic development and reduce poverty. The *Livestock in Africa: Improving Data for Better Policies* Project aims to first pilot and develop methodologies for identifying, collecting and analyzing livestock data, which facilitate pro-poor investments in the sector in Uganda, Tanzania and a West African country to be decided (Niger or Mali), and then to support their

institutionalization into the national framework of agricultural statistics, which only can ensure the continuous design and implementation of efficient and equitable investments in the livestock sector.

The Project's focus is on data related to livestock, poverty and markets, based on the assumption that a sustainable and inclusive development of the sector can be ensured only if (poor) livestock operators have the incentives to enhance their production and productivity, i.e. farmers need accurate and timely price signals to where and when sell their production surplus (Spielman and Pandya-Lorch, 2009). Household surveys and rapid appraisals will be used to identify key constraints that thwart smallholder access to market, suggest investment options that would enhance the contribution of livestock to their livelihoods, and recommend key livestock data to be regularly collected, processed and disseminated to ensure the continuous formulation and implementation of pro-poor and socially desirable investments in the sector. A communication and advocacy strategy will support the institutionalization of key livestock data into national statistical systems and a sourcebook will be prepared to provide guidelines for pro-poor livestock-data collection, analysis and dissemination.

The project's success will depend on its capacity to address three critical issues. The first is that there is asymmetric information concerning data gaps and needs for livestock. Countless livestock-related variables and indicators could be generated and used to better guide policy and investment decisions. However, only data users (producers, the government, development actors, and a host of others) can clearly articulate which ones they need, and in what form. The Livestock Data Project should be therefore largely demand driven, and its activities detailed and adjusted as data users in each country recommend. Second, it is tricky to identify micro-level data to be collected to formulate equitable livestock investments, and then recommend that national statistics offices collate those data on a regular basis, as household surveys are not routinely implemented in all countries. A comprehensive review and understanding of existing databases (and their rationale) is therefore essential to identify appropriate institutional options to integrate livestock into national statistical systems. Finally, stakeholders tend to look for data and indicators which support specific investments or government objectives, such as for example the number of livestock to be vaccinated or prices for live animals in major regional markets, and disregard the livestock-poverty interface. There could be thus limited incentives for the institutionalization of livestock-poverty data into national statistical databases, unless the Project effectively proves that investing in the livestock-dependent poor generates handsome returns in terms of both poverty reduction and economic development.

REFERENCES

- AU (2010) *Resolutions of the 8th Conference of Ministers Responsible for Animal Resources in Africa*. African Union, Kampala.
- AU-IBAR (2009) *Strategic Plan 2010-2014*. African Union – Inter-African Bureau for Animal Resources, Nairobi.
- Baldwin K.L., V. DeVeau, K. Foster and M. Marshall (2008) Traits Affecting Household Livestock Marketing Decisions in Rural Kenya. Selected Paper prepared for presentation at the American Agricultural Economics Association Annual Meeting, Orlando.
- Barrett C.B., T. Reardon and P. Webb (2001) Nonfarm income diversification and household livelihood strategies in rural Africa: concepts, dynamics, and policy implications. *Food Policy*, 26(4): 315-331.
- Blench R. (1999) The Nigerian National Livestock Resource Survey: a personal account. In C. Baroin and J. Boutrais (eds.) *L'Homme et l'animale dans le Bassin du Lac Tchad*, IRD, Paris.
- Carletto G. (2010) Improving the Availability, Quality and Policy-Relevance of Agricultural Data: the Living Standards Measurement Study – Integrated Surveys on Agriculture. Paper presented at the Third Global Conference on Agricultural and Rural Household Statistics, Washington D.C.
- Chambers R. (1981) Rapid rural appraisal: Rationale and repertoire. *Public Administration and Development*, 1(2): 95-106.
- Chen S. and M. Ravallion (2008) The Developing World is Poorer than we Thought, But no Less Successful in the Fight against Poverty. Policy Research Working Paper 4703, World Bank, Washington D.C.
- Chilonda P. and J. Otte (2006) Indicators to monitor trends in livestock production at national, regional and international levels. *Livestock Research for Rural Development*, 18 (6).
- Davis B., P. Winters, G. Carletto, K. Covarrubias, E.J. Quinones, A. Zezza, K. Stamoulis, C. Azzarri and S. Di Giuseppe (2010) A Cross-Country Comparison of Rural Income Generating Activities. *World Development*, 38(1): 48-63.
- Deaton A. (1997) *The Analysis of Household Surveys. A Microeconomic Approach to Development Policies*. Johns Hopkins University Press, Baltimore and London.
- Devendra C. (2007) Constraint analysis to improve integrated dairy production systems in developing countries: the importance of participatory rural appraisal. *Tropical Animal Health and Production*, 39(8): 549-556.
- Dokalyo A. (2009) Les éleveurs du Tchad doutent de la crédibilité des résultats du recensement général de la population et de l'habitat. Centre d'Etudes et de Formation pour le Développement (CEFOD), www.cefod.org.
- FAO (1992) *Collecting Data on Livestock*. FAO Statistical Development Series 4, FAO, Rome.
- Gelan A. and B. Muriithi (2010) Measuring and Explaining Economic Efficiency of Dairy Farms: A Case Study of Smallholder Farms in East Africa. Paper presented at the 3rd Conference of African Association of Agricultural Economists: Africa and the Global Food and Financial Crises, Cape Town.

- Ha D.T. and G.E. Shively (2008) Coffee Boom, Coffee Bust, and Smallholder Response in Vietnam's Central Highlands. *Review of Development Economics*, 12(2): 312-326.
- Hayami Y. and K. Otsuka (1993) *The Economics of Contract Choice: An Agrarian Perspective*. Clarendon Press, Oxford.
- Hurley R. (1957) Livestock data problems in the Census of Agriculture. *Journal of Farm Economics*, 39(5): 1420-1426.
- Jabbar M.A., D. Beker and M.L. Fadiga (eds.) (2010) *Demand for livestock products in developing countries with a focus on quality and safety attributes: Evidence from case study*. Forthcoming.
- Malainine M.L.C. (2001) 2000 General Population and Housing Census in Mauritania: Specific Characteristics of the Nomadic Environment. Paper presented at the Symposium on Global Review of 2000 Round of Population and Housing Censuses, Mid-Decade Assessment and Future Prospects, UN Statistics Division, New York.
- Niamir-Fuller M. (ed.) (1999) *Managing Mobility in African Rangelands*. Intermediate Technology Publications, London, and FAO, Rome.
- Nordlund K.V., W.J. Goodger, T.B. Bennett, M. Shamsuddin and R. F. Klos (2007) Methods for conducting an economic opportunity survey in smallholder dairy farms. *Tropical Animal Health and Production*, 39(8): 557-566.
- Perry B. and K. Sones (2010) Improving the quality and availability of data to support livestock-for-development initiatives in sub-Saharan Africa: Strategic Recommendations to the Bill and Melinda Gates Foundation. Unpublished paper.
- Randall S. (2006) Data on pastoralist populations. Discussion paper for an ILRI workshop on pastoralist poverty, Nairobi, June.
- Rich K., D. Baker, A. Negassa and R.B. Ross (2009) Concepts, applications, and extensions of value chain analysis to livestock systems in developing countries. Paper presented at the International Association of Agricultural Economists Conference, August, Beijing.
- Rios A.R., Shively G.E. and W.A. Masters (2009) Farm Productivity and Household Market Participation: Evidence from LSMS Data. Paper presented at the International Association of Agricultural Economists Conference, August, Beijing.
- Spielman D.J. and R. Pandya-Lorch (2009) Fifty Years of Progress. In D.J. Spielman and R. Pandya-Lorch (eds.) *Millions Fed. Proven Successes in Agricultural Development*. IFPRI, Washington D.C.
- UN (2010) *Global Strategy to Improve Agricultural and Rural Statistics*. United Nations Economic and Social Council Statistical Commission. Forty-first Session, 23-26 February.