

TECHNICAL CONVERSION FACTORS FOR AGRICULTURAL STATISTICS: STUCK IN OBLIVION? THE CASE OF TANZANIA LIVESTOCK STATISTICS

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1. DATA TO MEASURE PRODUCTION AND PRODUCTIVITY

Increases in livestock productivity are essential for economic growth and poverty reduction in much of the developing world. The usefulness of any productivity measure strongly depends on the quality of the data available to measure inputs and outputs. Data on inputs and outputs in traditional farming systems are usually collected by an enumerator, who visits the (farm) household and asks detailed questions on livestock inputs and outputs. Direct interviews are appropriate to capture with statistical precision information on variables which are slowly moving, such as the number of large and small ruminants and, to some extent, variables for which the respondent is anticipated to have some knowledge / memory, such as the number of animals affected by a certain type of disease over the reference period. They are not the first best methods to estimate variables which are continuously changing and are characterized by a high degree of variability, such as meat, milk and manure production. Under these circumstances, adequate estimation of technical conversion factors are needed to produce statistically robust livestock production indicators.

Technical conversion factors

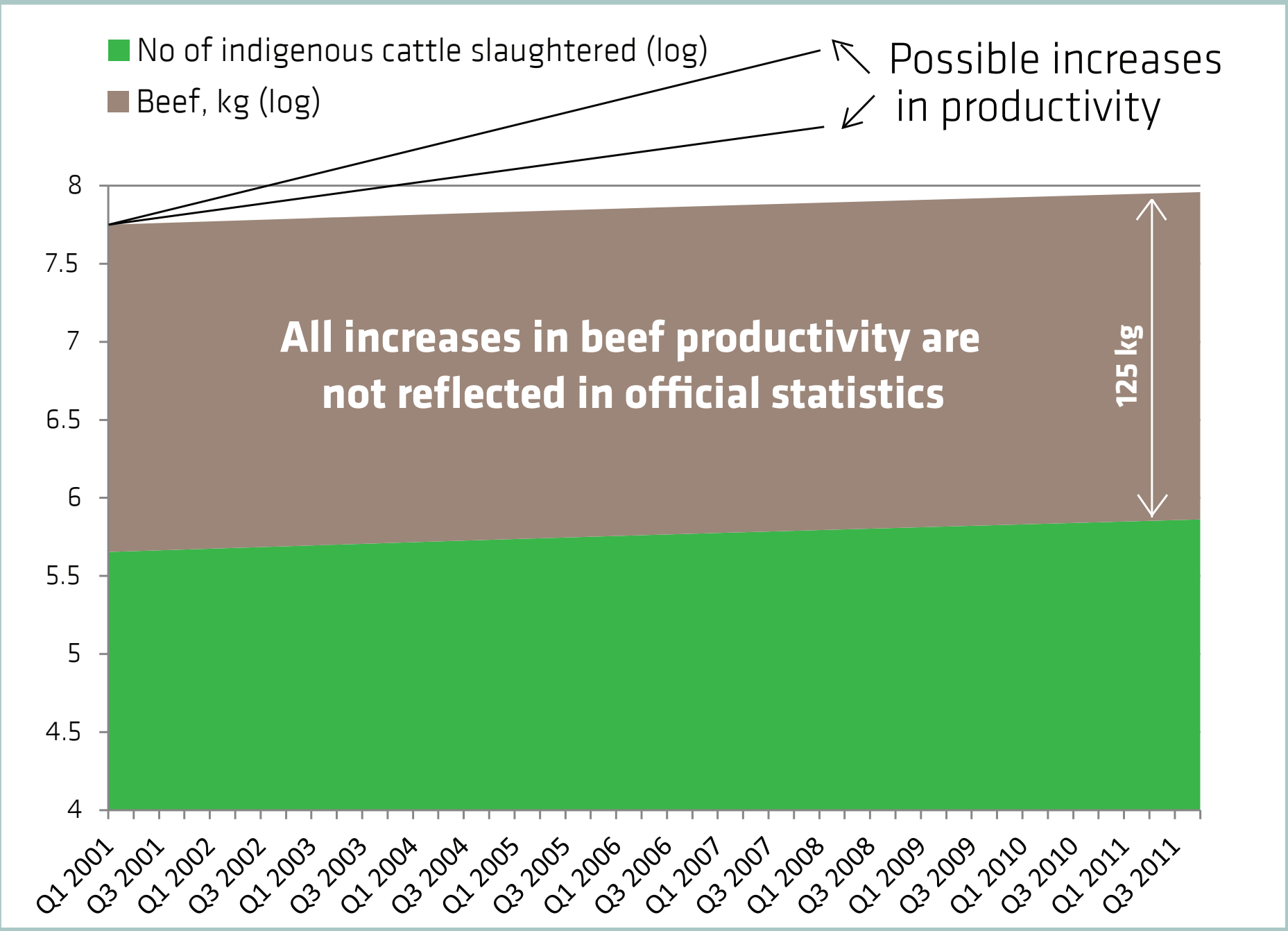
Technical conversion factors are coefficients that convert a measured quantity to a different unit of measure. Examples of livestock technical conversion factors are:

- ‘Meat per slaughtered animal’, which allows calculating total meat production when multiplied by the number of animals slaughtered over a certain period in a certain area.
- ‘Off take rate’, which allows arriving at an estimation of the number of animals slaughtered from data on the total livestock population over the reference period.
- ‘Milk production per cow/day’, which allows estimating the level of milk production by counting the number of milking cows over a given period / area.
- ‘Dung per adult cattle’, which allows calculating the level of production for one of the major by-products of large ruminants, manure, by counting the adult cattle population over the reference period.
- ‘Eggs per hen’, ‘dry matter intake/day per animal’, ‘weight gain per kg of dry matter intake’, etc. are other technical conversion factors which, if available, are useful to generate nationally representative production and productivity statistics for the livestock sector.

2. LIVESTOCK TECHNICAL CONVERSION FACTORS IN TANZANIA

A variety of technical conversion factors are used to generate livestock statistics in the Tanzania National Accounts, such as meat per slaughtered animal; eggs per indigenous and exotic hens; manure produced per live animals; milk yield per milking animals, etc. For example, beef production is calculated by multiplying the total number of beef cattle slaughtered by 125, which is the technical conversion factor used to convert beef carcasses into kgs of meat. The ‘meat conversion factors’ for goats, pigs and indigenous chickens are 12, 45 and 2 kilos respectively; as for cow milk, the technical coefficient used is 1 litre of fresh milk/day per cow.

Fig 1. Cattle beef slaughtered and beef production in Tanzania, 2001-2011



Source: Tanzania National Bureau of Statistics, unpublished data

The challenge in Tanzania, which is similar in most other developing countries, is that the adopted technical conversion factors are obsolete. They are calculated using data from non-representative or biased samples, taken from neighboring countries, and/or rarely updated. The implications for effective sector management and policy orientation hold adverse consequences for sector development and investment.

For example, figure 1 displays how from 2011 to 2013 increases in beef production in the Tanzania National Accounts only reflect the increased number of animals slaughtered with the consequence that likely improvements in animal productivity – which are in part reflected in the value of livestock technical conversion factors – are not captured in official statistics. This implies that all policies and investments implemented by the Ministry responsible for animal resources which focus on increased beef cattle productivity are unappreciated in official statistics.

3. METHODS TO UPDATE TECHNICAL CONVERSION FACTORS

Since 2012, the Ministry of Livestock and Fisheries Development of Tanzania (MLFD) and the National Bureau of Statistics (NBS) have been collaborating under the framework of the Tanzania Statistical Master Plan to update selected technical conversion factors. In particular, NBS and MLFD agreed upon a Memorandum of Understanding (MoU) ‘on the use of Tanzania Statistical Master Plan (TSMP) Funds to Support Improvement of the Agricultural Statistics System in the Country.’

As part of the implementation of the MoU, in June / July 2013 MLFD, in collaboration with NBS, collected data on milk, egg and meat production in three agro-ecological zones in Arusha (Northern Zone), Dodoma (Central Zone) and Mwanza (Lake Zone) during the long-rainy season. In particular, a sample of 540 livestock farming households were trained to collect data on a daily basis on milk and egg production, while MLFD staff were located in 3 slaughterhouses to physically measure carcass weight of slaughtered animals. The collected data allowed producing preliminary estimates for the following three technical conversion factors:

- Milk yield per indigenous cow;
- Egg per laying indigenous hen;
- Meat per indigenous cattle slaughtered.

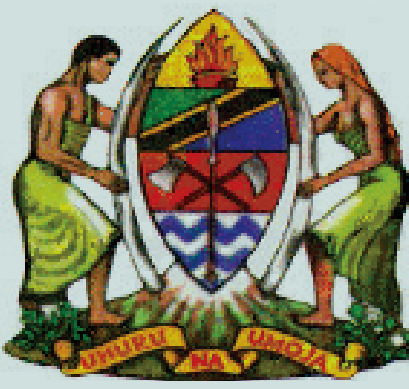
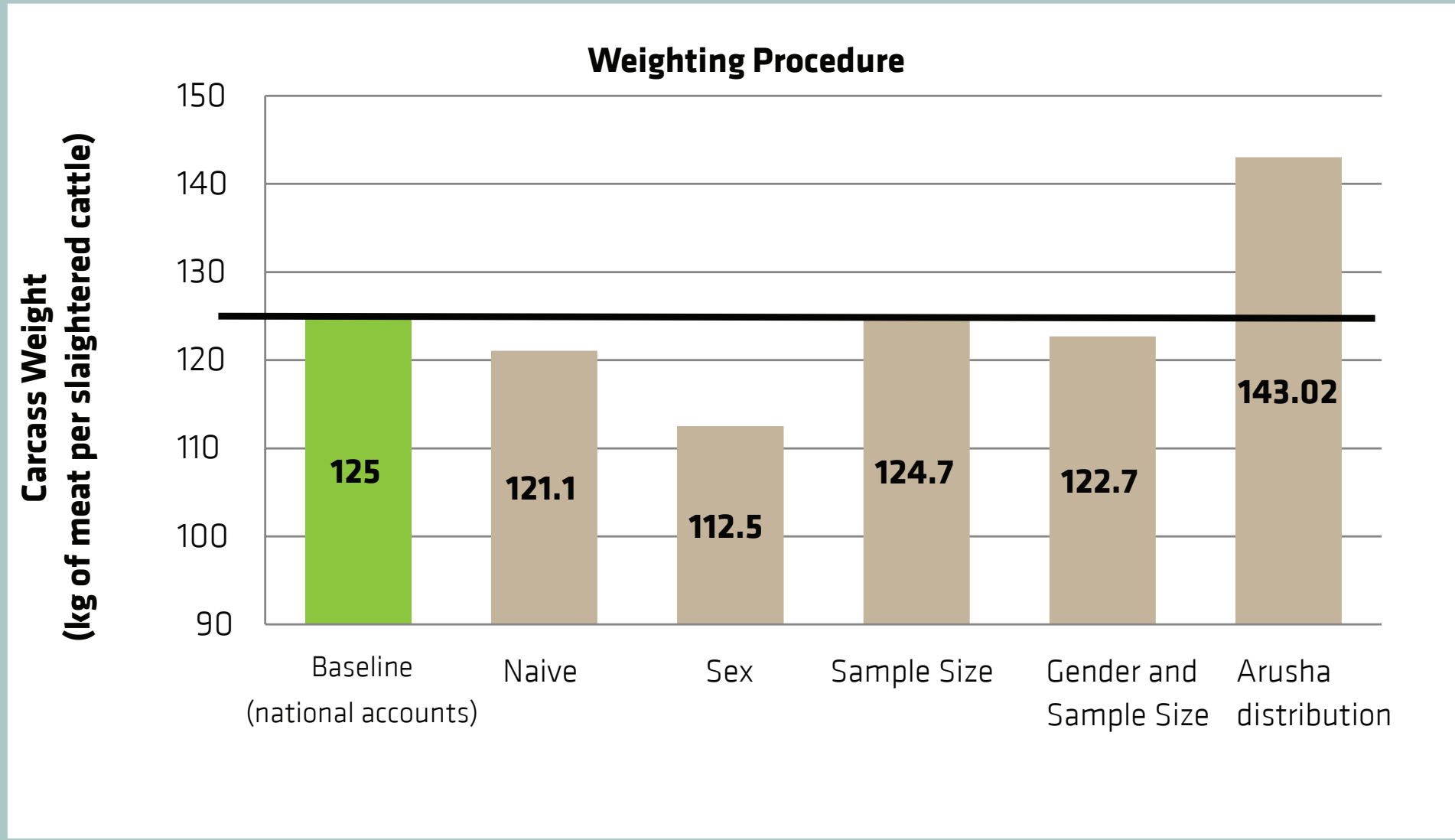
These TCFs were selected as indigenous cattle and hens are the most common livestock kept by Tanzanian Households.

4. PRELIMINARY RESULTS

Preliminary analysis of the collected data suggests that:

- The TFC for beef production used in the National Accounts, i.e. 125 kg/head, is consistent with the collected data. However, depending on the weighting procedure, it could range between 113 or increased to a maximum of 143 kg/head.
- The TCF for indigenous cow milk used in the National Accounts, i.e. 0.97 litre/day, most likely underestimates aggregate milk production. The estimated TCF ranges between 1.34 and 1.37 litre/day which is line with data from the National Panel Surveys. The estimated TCF using data from 2007/2008 Agricultural Census is 1.81 litre/day.
- The TCF for eggs from indigenous hens in the National Accounts, i.e. 45 eggs per year per hen, somewhat underestimates egg production, largely due to underestimation in the clutching period. The estimated TFC ranges from 44.4 to 59.2 egg/year per hen.
- Overall, preliminary results suggest that National Accounts might provide a reliable estimate of beef production, but might underestimate milk production by 13 to 27 percent and egg production by 13 to 29 percent.

Meat (kg) per slaughtered cattle



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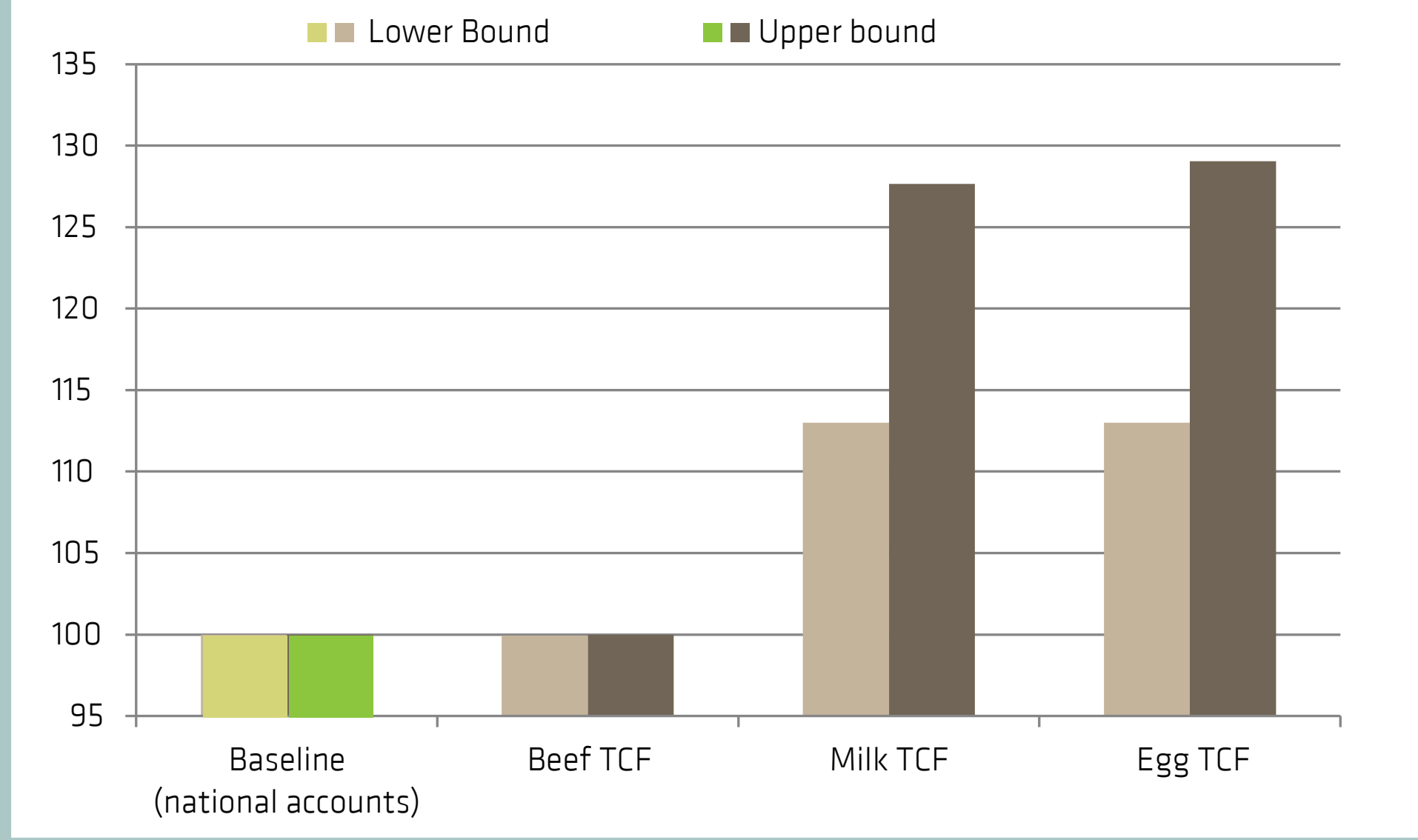
Milk (lit) per indigenous cow

	AMOUNT OF MILK PER DAY	TCF FOR MILK PRODUCTION WITH 150 DAYS OF LACTATION
NATIONAL ACCOUNTS	0.96	144.7
NAIVE ESTIMATE FROM MLFD DATA	1.34	201.0
REGIONALLY WEIGHTED ESTIMATE FROM MLFD DATA	1.37	205.5
AGRICULTURAL CENSUS 2007/08	1.81	271.5
NATIONAL PANEL SURVEY 2008/09	1.27	190.5

Eggs (no.) per indigenous hen

	NUMBER OF CLUTCHES PER ANNUM	EGGS PER CLUTCH	EGGS PER DAY	EGGS PER YEAR
NATIONAL ACCOUNTS	3	15		45
SURVEY QUESTION	3.3	13.9		
15 DAYS LAYING PERIOD	3.3		0.9	44.4
20 DAYS LAYING PERIOD	3.3		0.9	59.2

Impact on livestock value added



5. THE WAY FORWARD

MLFD and NBS have identified some options to improve data collection to estimate livestock technical conversion factors, which target sampling, data collection methods and questionnaire design.

Over the next 12 months MLFD and NBS will collect data from the same sample of farmers and slaughterhouses for the short rainy seasons and well as data from a similar sample of households / slaughterhouses in the other three agro-ecological zones of the country. Results will be used to update the current technical conversion factors used in the National Accounts.

Additional resources are needed to update other livestock technical conversion factors, such as for poultry and pork production as well as for improving the quality of information on the intermediate inputs.

Physically measuring production output is a time-consuming costly activity. MLFD and NBS plan to jointly analyse data from a variety of agricultural and household surveys to better understand if more precise estimates of technical conversion factors can be obtained using survey data.

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