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Improved Region-Specific Emission Factors for Enteric Methane Emissions from Cattle in Nandi County, Kenya

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Abstract

National greenhouse gas (GHG) inventories in most developing countries, and in sub-Saharan Africa (SSA) in particular, use default GHG emission factors (EF) provided by the Intergovernmental Panel on Climate Change (IPCC) to estimate methane (CH_4) emissions from livestock – a so-called Tier 1 approach. Due to the fact that these EFs are based on data primarily collected in developed countries in the Northern Hemisphere, there is a high degree of uncertainty associated with CH_4 emission estimates from African livestock systems. Accurate Tier 2 GHG emission reporting from developing countries becomes particularly necessary following the Paris Climate agreement after COP21. Following this need, the objective of this study was to derive region-specific enteric EFs using Tier 2 methodology for cattle under smallholder livestock production systems in Kenya. Data on cattle characteristics and performance was collected from 127 households in 36 villages within three agro-ecological zones (AEZ) in Nandi County, over the duration of one full year. Live weight (LW), growth, milk yield, milk quality and calving were recorded for 1,146 cattle that were grouped by sex and maturity. Analysis of representative feed samples was performed to estimate dry matter digestibility (DMD) of the available feed for each of the AEZs and seasons. DMD ranged from 52–66.6 % (x=62.0 %). Dry matter intake (DMI) was derived from estimated total energy requirement. DMI and DMD were used to calculate daily methane production using a newly available CH_4 conversion factor to create new region specific EFs.

Enteric CH_4 EFs were: 39.9, 48.5, 30.6, 36.1 and 31.6 kg CH_4/head/year for mature females, mature males, heifers, steers and calves respectively, the herd weighted mean being 36.5 kg which is substantially lower than the IPCC's Tier 1 estimates for unspecified African adult cattle.

Keywords: Africa, cattle, emission factor, enteric methane

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