Tropentag, September 17-19, 2018, Ghent

"Global food security and food safety:
The role of universities"

Carbon Footprint (CF) in Breeding Cattle Systems in Colombia

Ricardo Gonzalez[1], María Solange Sánchez-Pinzón[2], Diana María Bolívar-Vergara[3], Ngonidzashe Chirinda[4], Jacobo Arango[5], Rolando Barahona[6]

[1]*International Center for Tropical Agriculture (CIAT), Colombia*
[2]*Nacional de Chocolates Company, Environmental Management,*
[3]*National University of Colombia, Animal Production,*
[4]*International Center for Tropical Agriculture (CIAT), Soils and Climate Change, Colombia*
[5]*International Center for Tropical Agriculture (CIAT), Colombia*
[6]*National University of Colombia, Dept. of Animal Production, Colombia*

Abstract

The agricultural sector is responsible for the second largest amount of GHG emissions in Colombia (26 %) and within this sector, livestock production contributes with the largest amount (31 %). Cattle breeding systems account for 15 % of the national livestock inventory; however, the literature reports on the GHG emissions per unit of product are limited. The carbon footprint (CF) was calculated for cattle breeding systems belonging to very small, small, medium and large cattle farmers in Colombia. A total of 251 farms were surveyed in 13 states to obtain the data analyzed. Surveyed farms were classified according to the cattle population: very small (0–30 animals), small (31–50), medium (51–250) and large breeders (251–500). The 146 observed variables among categorical and numerical were analysed using the Factorial Analysis of Mixed Data (FAMD) approach. Through FAMD analysis, a centroid for each cattle rancher´s category was identified. To estimate the CF, the farm closest to the centroid of each category was selected. A "cradle to the farm gate" boundary was established. The functional unit was 1 kg of live weight gain (Kg LWG). The CF was estimated by using the equations established by the IPCC (2006), emission factors from other studies and databases. The farms with the highest cattle population had the highest LWG. The total GHG emissions (Kg CO_2eq kg LWG^{-1}) were lower in farms belonging to small (29.0 Kg CO_2eq kg LWG^{-1}) and medium breeders (21.8 Kg CO_2eq kg LWG^{-1}), while the very small (52.2 KgCO_2eq kg LWG^{-1}) and large (37.3 Kg CO_2eq kg LWG^{-1}) had higher CF. The gas species with the highest contribution to the emissions was methane, and enteric fermentation was the main process responsible for these emissions (between 80 and 82 %). Although large breeders had better productive parameters (LWG), the higher percentage of unproductive animals in the herd (53 %) contributed to a large extent to the CF. The farm belonging to very small farmers presented the highest CF, which is related to lower LWG. It is important to improve the productive and reproductive performance in the herd in order to mitigate the emissions from the studied systems.

Keywords: Breeding cattle systems, global warming potential, greenhouse gases (GHG), life cycle assessment (LCA), sustainable systems

Contact Address: Ricardo Gonzalez, International Center for Tropical Agriculture (CIAT), Cali, Colombia, e-mail: ricardo.gonzalezq@udea.edu.co