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Co-integrated panel models to estimate relationships between cattle and greenhouse gas emissions for Latin America

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Abstract

The cattle sector is key to the economy of several Latin American countries, however, it strongly contributes to environmental degradation through the emission of greenhouse gases and deforestation, among others. The objective of this study is to analyse the long- and short-term relationships of variables such as population growth, expansion of pastureland, and deforestation with cattle greenhouse gas emissions and beef and dairy production for 15 Latin American countries. Using information consolidated by FAOSTAT for the period between 1990–2019, a cointegrated panel method (Pooled Median Group) was applied, with which six specifications were estimated. The main results show that, in the long-term, a population growth of 1 % decreases methane emissions derived from manure management in beef production by 1.41 % and increases those derived from enteric fermentation by 0.97 %. Likewise, a 1 % expansion of pastureland increases methane emissions from manure management by 2.66 % and decreases those related to enteric fermentation by 2.15 %. The results indicate that at the aggregate level for the region there is evidence of stable long-term relations. This means that the effects population growth, the expansion of pastureland, and deforestation have on greenhouse gas emissions from cattle production tend to decrease over time. This long-term behaviour may be marked by those countries that have a more developed cattle sector, aimed at reducing the impacts of cattle production on the environment, for example, by supporting the adoption of improved forage technologies, silvo-pastoral systems, grazing management practices, and regulatory frameworks and incentives. The cattle sector of these countries can be used as a regional benchmark and its lessons learned as inputs for sustainable intensification processes in countries with a developing cattle sector.

Keywords: Cattle, co-integration, deforestation, greenhouse gas emissions, pooled median group, sustainability