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“Filling gaps and removing traps
for sustainable resource management”

Estimation of the Optimal Nitrogen Dose in a *Brachiaria humidicola* – Corn Rotation System in the Colombian Eastern Plains

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Abstract

Improving nitrogen use efficiency (NUE) by optimising the N fertiliser application dose is one way to reduce greenhouse gas emissions in agriculture and livestock production, especially in higher demanding crops such as corn. Taking a *Brachiaria humidicola* (Bh)-corn rotation system in the Colombian Eastern Plains as a case study, we seek to determine both the optimal economic dose (OED) and the optimal technical dose (OTD) of N, which allow to maximise income at producer level and minimise environmental impacts. This particular rotation system was chosen as research subject given the presence of the residual effect of Biological Nitrogen Inhibition (BNI) in permanent lots of Bh (established for >10 years), which has positive impacts on corn production such as increased yields and better N efficiency. The data for this study was obtained from trials conducted between 2013 and 2017, where corn production in a Bh-corn rotation system (with residual BNI effect) was compared with conventional corn production (without residual BNI effect). For determining the OED and OTD of N, three response models will be applied: a pseudo-quadratic model, a continuous curvilinear model and a discontinuous rectilinear model. The comparison of these models will also allow to identify the most suitable model for obtaining the best OED and OTD estimates of N. The results of this study will be key for providing recommendations to primary producers on the correct doses of N in a Bh-corn rotation system. This will contribute to improving both efficiency in production and profitability, and help to avoid the excessive and unnecessary application of nitrogen fertilisers and its associated negative effects on the environment.

Keywords: Agro-pastoral systems, bovine livestock, climate change, Latin America, sustainable intensification