Low Carbon Beef: A Case Study in a Sandy Soil from Brazilian Cerrado

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Global demand for food is increasing, which pressures for greenhouse gas emissions reduction or neutralization to mitigate the climate change. In this context, Brazil has developed technologies to produce beef with lower carbon emissions. This study aimed to evaluate a low carbon strategy for intensifying beef cattle raising in areas of consolidated use in sandy soils of the Brazilian Cerrado, West of Bahia's State, through enteric emissions, liveweight gain (LWG) and changes of stocks of soil organic carbon (SOC) from 0 to 40 cm layer. SOC calculations were performed in 2019 and 2021 using the DNDC model and Urquiaga et al. (2016) protocol, while enteric methane emissions used the ALU model. From July 2019 to June 2020, 10 months Nellore cattle were evatuated in two treatments: pasture using low carbon beef protocol (LCB, Embrapa), characterized by soil-plant-animal management practices; pasture using farm conventional management (FCM). Native Cerrado (CER) was used as a control for SOC. Enteric emissions for LCB and FCM treatments were 1.1 tCO_2 eq and 1.4 tCO_2 eq head/year, respectively. The LWG was 1.4 and 0.4 t/ha/year for LCB and FCM, respectively. The initial SOC by DNDC model was 13.5 tC ha^{-1} for CER; 22.4 tC ha^{-1} for LCB and 18.2 tC ha^{-1} for FCM and final SOC was 14.4 tC ha^{-1} for CER; 18.6 tC ha^{-1} for LCB and 16.0 tC ha^{-1} for FCM. The initial SOC by Urquiaga et al. (2016) protocol was 26.2 tC ha^{-1} for CER; 29.2 tC ha^{-1} for LCB and 26.8 tC ha^{-1} for FCM and final SOC was 23.9 tC ha^{-1} for CER; 23.5 tC ha^{-1} for LCB and 21.8 tC ha^{-1} for FCM. In conclusion, LCB was more efficient than FCM, since it was possible to increase beef production with lower per capita emissions and greater soil carbon accumulation.