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The objective of this study was to evaluate with life cycle assessment (LCA) the effects of the addition of feed-use amino acids (FU-AA), on the environmental impacts of pig production in Brazil. The LCA considered the process of pig fattening in South Region of Brazil, including production and transport of feed ingredients and complete feeds, raising of pigs, and manure management. Impacts were calculated at farm gate and the functional unit was one kg of body weight gain over fattening. We considered a fattening pig farm with diets mainly based on maize and soybean meal in a 4-phases feeding program. Soybean was assumed to be produced without deforestation. Diets evaluated were: without FU-AA (noAA), with FU-AA and minimum crude protein (CP) content (withAA), and with FU-AA without CP constraint (lowCP). Performance and excretion of pigs, from 30 kg BW on average to an average BW of 115 kg at slaughter, were simulated for each FU-AA scenario using InraPorc population model (2000 pigs/scenario) and considering between-animal variability. The LCA calculations were performed for each pig, according to its individual performance and excretion, using a calculation model developed with SAS software and the results were subjected to variance analysis using SAS. For climate change, the incorporation of FU-AA did not appear to be an efficient strategy since the lowest impact (2.38 kg CO_2-eq.) was obtained for noAA diets and the higher for lowCP diets (2.51 kg CO_2-eq.; $P<0.001$). Similar effects were observed for cumulative energy demand and terrestrial ecotoxicity, which also increased ($P<0.001$) by about 8.57 and 7.97%, respectively, with FU-AA addition. Conversely, acidification and eutrophication potential impacts were significantly reduced ($P<0.001$) by FU-AA addition in a rather similar way, the lowest impact being observed for the lowCP diets, which showed 11.4 and 13.1% lower acidification and eutrophication, respectively, compared to noAA diets. Similarly, land occupation was reduced ($P<0.001$) by about 6.92% when incorporation of FU-AA increased. It appears from the results that climate change, energy demand and ecotoxicity depend mainly on the impacts of the feed ingredients, whereas acidification and eutrophication are highly dependent on nitrogen excretion.

Key Words: swine, crude protein, environmental impact, life cycle assessment