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The environmental consequences of feeding growing-finishing pigs with reduced dietary nutrient levels

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Life cycle assessment (LCA) has been used in many studies to evaluate the effect of feeding strategy on the environmental impact of pig production. However, in Brazil there are hardly any results on this topic. The objective of this study was to evaluate the effect of diet formulation with nutritional requirements estimated by mathematical model on LCA impact of pigs from 25 to 130 kg live weight, produced in a typical farm in the South of Brazil. Forty gilts and 40 barrows (24.5 ± 1.8 kg) were distributed in a randomized block design with two treatments, 10 replications per treatment, and four animals per experimental unit. The feeding program was in four phases. Two diets were formulated for each feeding phase: LN - adjusted using InraPorc® model to minimize the crude protein, amino acids and phosphorus excess (LN); ST - adjusted to suit the standard Brazilian recommendations (Rostagno et al., 2011). The LCA considered the process of pig fattening including production and transport of feed ingredients and complete feeds, raising the pigs, and manure management. Impacts were calculated at farm gate and the functional unit was one kilogram of body weight gain over fattening. The LCA calculations were performed for each experimental unit according to its own performance and excretion. Data were subjected to ANOVA with the main effects of treatment, block, sex and interaction between treatment and sex, using SAS. In the overall period, pigs fed with LN diet consumed 16.1 and 10.1% less crude protein and total phosphorus, respectively. The LN diets showed to be an efficient feeding strategy to reduce the impact of pig production on the variables appointed as indicators of climate change by about 3.75%. Similar effects were observed for acidification and eutrophication, which were reduced 8.19 and 9.47%, respectively. Terrestrial ecotoxicity and land occupation were 4.02 and 8.79% lower, respectively, when pigs were fed with LN diets. Conversely, cumulative energy demand was not affected by dietary nutrient reduction. It was concluded that the reduction of crude protein, amino acids and phosphorus contents to better adjust nutrient supplies to animals requirements appears very effective for reducing life cycle impact of pig fattening.

Key Words: life cycle assessment, nutrient supplies, fattening pigs, environment.