

## HUMAN NUTRITION

**Title:** A Comparative Life Cycle Assessment of Pork Meat and Non-Meat Alternative Patties **(NPB #19-226)**

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**Scientific Abstract:** A cradle-to-grave life cycle assessment of carbon, energy, water, and land footprints was conducted to evaluate differences in potential environmental impacts of pork meat versus plant-based non-meat alternative patties such as Beyond Burger (BB), Impossible Burger (IB) and Veggie Burger (VB). Nutritional quality assessment was also performed using nutrient-rich food indices to compare the nutrient profiles of each product. Differences in environmental impacts were observed between products. Pork consumption was found to have the highest relative impact on global warming potential and land occupation. Feed production was the most significant contributor to the impact, whereas, for the non-meat alternative patties, production of ingredients was the largest contributor. Unlike to other plant-based patties, the IB consumption had high intensity of energy demand, especially electricity consumption, during the manufacturing stage. The contribution at processing and packaging stage was relatively low and that retail refrigeration and in-home cooking with loss were substantial contributors to the overall environmental impacts. A sensitivity analysis indicates that cooking loss clearly affects the results of GHGEs, but it does not affect the overall interpretation of the result. The average carbon footprint of BB, IB, VB, and pork were 8.07, 8.10, 5.43, and 12.2 kg CO<sub>2</sub>-eq per kg of products at consumption stage, respectively. Water use and land occupation impacts display a similar trend as carbon footprint. Nutritional profile analysis yielded conflicting results. Pork products indicated lower NRF<sub>9.3</sub> scores compared to BB and VB, however, the NRF<sub>15.3</sub> score indicated that pork products had higher nutritional value. This initial evaluation of nutrient quality in the context of environmental sustainability highlights the need for further research at the intersection of dietary health and environmental sustainability.

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