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GREENHOUSE GAS EMISSION REDUCTION IN FROZEN FOOD PACKAGING

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Abstract

This study evaluates the environmental impacts of four types of frozen food packages throughout their lifecycle and suggests strategies for reducing their related environmental impacts. The four most widely used frozen food packaging materials were chosen for this study: (1) pouches composed of low-density polyethylene (LDPE) film; (2) pouches composed of polyethylene terephthalate (PET) and LDPE film laminate; (3) cardboard boxes coated with LDPE; and (4) multipackage composed of cardboard boxes and LDPE film pouches. The packages are processed by a company located in Europe (Lithuania). The assessed environmental impact category was global warming. The global warming potential of packages expressed as greenhouse gas emissions (kg CO_2 eq.) was evaluated using the CCaLC software package based on a life cycle assessment (LCA), which constitutes a quantitative methodology. The mechanical properties of the various types of packaging were examined, and the optimization of plastic film thickness was verified using polymer tension tests. The multipackage consisting of a cardboard box and an LDPE film pouch has the greatest global warming potential (98 kg CO_2 eq./f.u.) followed by packages composed of cardboard and packages composed of laminated film. Production and raw material extraction stages account for most (up to 75%) of the environmental impact. Data from the polymer tension tests indicate that the environmental impact could be reduced by 36% (from 35 to 22 kg CO_2 eq./f. u.) by decreasing the plastic film thickness as well as by reducing the package size by 10%.

Key words: frozen food packaging, global warming, life cycle assessment, tensile pulling force

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