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Energetic-Environmental Assessment of Milk Production Systems in South of Minas Gerais State: Traditional Small Family-Managed Versus "Minas Leite" Program

OLIVEIRA, M. W.[a, b], AGOSTINHO, F.[a]

[a] *Programa de Pós-Graduação em Engenharia de Produção, Universidade Paulista, São Paulo*

[b] *Instituto Federal de Educação, Ciência e Tecnologia, Sul de Minas Gerais*

**Corresponding author, max.oliveira@ifsuldeminas*

Abstract

In the state of Minas Gerais, which is considered Brazil's top milk producing state, a program named "Minas Leite" (Minas Milk) aims at increasing the productivity of small family-managed agricultural properties by introducing efficient farming management techniques. The program's goal is to reach every small family-managed producer statewide, which would probably result in a social-economical shift within the producing regions. On the other hand, such program focuses on economic and social issues, raising doubts about the actual energetic-environmental cost of its implementation. Thus, the aim of this work is to carry out a comparative analysis regarding the energetic-environmental performance between the traditional model of small family-managed milk production and the system intensified by the Minas Leite program, both of which are representatives of the southern region of Minas Gerais state. The embodied energy analysis and the emissions inventory are taken as scientific methodologies. Results show that for the hectare/year functional unit the traditional model performs better as compared to the "Minas Leite", because it demands 295% less energy for its activities (11,454 versus 33,768 MJ/ha/yr) and releases the same percentage ratio of gas emissions to atmosphere, indicating that production intensification requires higher energetic cost and causes higher environmental loading. On the other hand, when considering the amount of milk produced as functional unit, the traditional model performed worse, because it demands 177% more embodied energy than Minas Leite system (17.40 versus 9.83 MJ/L_{milk}) and has higher global warming potential (2,675 g$CO_{2\text{-eq.}}$/L_{milk}) compared to Minas Leite (1,508 g$CO_{2\text{-eq.}}$/L_{milk}). Considering that milk production is the main role of the two analyzed systems, the system intensified by the Minas Leite program has better energetic-environmental performance when compared to the traditional model.

Keywords: *Milk production, sustainability, embodied energy analisys, gas emissions inventory*