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Assessing Different Levels of Intensity on Economic and Water Footprint in Dairy Farming Systems in Bangladesh: Implication for Sustainable Milk Supply to the Urban Consumers

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Abstract

Milk production in Bangladesh falls under pressure due to rising demand from increasing urbanisation leading to intensification and higher water scarcity problem which ultimately affects environment, society and dairy production. To meet the growing needs of urban consumers without creating environmental burden, dairy farming needs to be efficient in both costs and water footprint. Therefore, the objective of this study was to assess the costs and water footprint (WF) in low, medium and high intensified farms located in rural, peri-urban and urban areas, respectively. This study further analysed four different scenarios based on rural low intensified farms in order to identify potential ways to reduce costs and WF in rural areas while keeping increasing production. A combination of both Life Cycle Assessment (LCA)-based WF calculation methods and TIPI-CAL (Technology Impact Policy Impact Calculation) model was used. The results showed that the higher the production intensity, the lower the costs per kg energy corrected milk (ECM) in urban farms while the opposite results were observed when analysing the WF. The single stand-alone WF (L $H_2O\,kg^{-1}$ ECM), integrating consumptive and degradative water use (WU) impacts, ranged from 11 to 45 (low to high intensity). On the other hand, the WF considering degradative emission in terms of a theoretical water volume ranged from 21 to 112. The feed cost had the highest contribution (an average 0.18 which accounts for 67 % of average costs 0.27 USD kg^{-1} ECM) to the total costs while the WF impact was mainly driven by the regional water stress index (WSI). The scenario analysis showed that there was a potential tradeoff between economy of production and reduction of WF that revealed that the altering farming system toward high yielding cows and on-farm feed production in rural areas with low WSI and increasing market link with urban consumers might be an option to reduce costs, decreasing environmental burden whereby it provides the option to supply milk to the urban consumers at a competitive price. This study, therefore, suggests that improving dairy farming in rural areas while linking rural farmers with urban consumers might be the sustainable milk production scenarios in future.

Keywords: Bangladesh, costs analysis, dairy farming, intensification, water footprint

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