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Manure anaerobic digestion and fertilizer production - assessment of technology energy demand.

Key words: manure, fertilizers, nitrogen cycle.

Abstract

Modern society is dependent upon intensive agricultural production, and yet awareness of the environmental impact of agriculture is limited. For example, it is not widely known that mineral fertilisers are not renewable resource. On the one hand, intensive crop cultivation uses a considerable amount of nitrogen fertilizers. These fertilizers are obtained in the Haber-Bosch process, thus their production consumes energy and fossil fuels. On the other hand, intensive animal breeding provides a substantial amount of nitrogen-rich waste streams – the manure. Both processes cause risk for the environment. A circular economy approach of redirecting manure derived nitrogen for fertilization purposes would be beneficial for the environment. In this research we focus on the problems associated with manure management and possible technical solutions. Moreover we try to compare the energy consumption of different nitrogen recovery strategies. In recent years review articles concerning individual manure treatment technologies were published (Darestani, Haigh, Couperthwaite, Millar, & Nghiem, 2017; Masse, Massé, & Pellerin, 2007), along with an article describing the possibilities in nitrogen and other nutrient recovery from municipal waste water (Mehta, Khunjar, Nguyen, Tait, & Batstone, 2015, Li et al. 2015). However, these articles describe mainly laboratory results, therefore economic efficiency comparisons are impossible. The aim of this research is to give a general overview of the nitrogen recycling problem and partially compare the environmental impact of individual solutions by energy demand assessment.

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