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Livestock Systems and Nutrient Cycling

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Abstract

Agricultural production systems in developing countries are evolving in response to growing demographic pressure. At low population densities crop and livestock production are specialized and based on low-input, low-output strategies. As population density increases and systems intensify, rural livelihoods increasingly depend on integration of land cultivation and livestock rearing. In mixed farming systems livestock enhance food security, provide a source of cash and draught and play a key role in recycling nutrients to sustain crop production. Integration of crop and livestock production is thus a mechanism to cope with risk and to intensify agriculture through more efficient use of labor and farm organic resources. At very high population densities the systems revert back to specialization and depend more on high-input, high-output strategies. This evolution trend is driven primarily by market demand and is mediated by labor availability, use of production enhancing technologies, such as using external sources of nutrients (fertilizers, feed supplements) and more efficient nutrient management. Analysis of case studies of agro-pastoral systems in the Sahel and crop-dairy systems in Eastern Africa under different levels of intensification suggests that as population density increases and systems intensify, soil nutrient management and livestock feed use are closely related and follow the following general pattern:

In nutrient-deficient systems manure is crucial to maintenance of soil fertility and crop production. In such systems, policy, institutional and technical options are required to improve access to inputs and outputs markets, increase productivity and revert nutrient depletion trends. In systems with nutrient surplus, manure becomes a polluting factor and therefore production efficiency should be improved while decreasing the emission of nutrients to the environment.

Keywords: Crop-livestock systems, livestock systems, nutrient cycling

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