



Tropentag, September 17-19, 2014, Prague, Czech Republic

“Bridging the gap between increasing knowledge and decreasing resources”

Potential of Livestock Dung Based Biogas in Rural Households in Nepalese Context

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Abstract

In Nepal, biogas as an energy source for cooking and heating has been considered to be an appropriate technology to cope with both destruction of forests and unhealthy indoor air pollution. The capacity for producing biogas is usually estimated based on the number of livestock at household or regional level. The results might be misleading due to the large variation of dung yield depending on livestock species and age. Fodder availability is another reason for the spatial and temporal variation of dung yields.

The study evaluates the potential of biogas production based on cattle and buffalo dung in three topographical zones of Nepal: mountainous, hilly, and lowland (Terai). The survey was carried out in 240 livestock holding households. Data of fresh dung yield were obtained from 210 livestock individuals classified into 4 categories: mature buffalo (> 3 yrs), young buffalo (\leq 3 yrs), mature cattle (> 3 yrs) and young cattle (\leq 3 yrs). The annual net availability of dung for biogas production is evaluated by considering an accessibility factor, the collection efficiency and the utilization ratio. Calculations are based on surveys in which the fuelwood equivalent of 1 m³ biogas is observed to be 4.57 kg by assuming the production of 0.036 m³ biogas from 1 kg of fresh dung.

Analyses reveal that through dung-based biogas production, the fuelwood consumption per household can be reduced by 14 %, 37 % and 60 % in mountainous, hilly and lowland areas, respectively. As expected, the average daily dung yield per buffalo is higher than that of cattle, and mature animals produce more dung than young ones. Despite the highest livestock number per household in mountainous (5.2) as compared to hilly (2.7) and lowland areas (2.6), the net availability of dung at household level is the lowest in mountainous areas due to lower availability of fodder.

Keywords: Biogas, buffalo, cattle, dung, energy, topography