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“Development on the margin”

Energy Potential of Excrement Biomass of Selected Domestic Animal Species

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Abstract

This paper summarises a research that was conducted in the Indian Himalayas, Zaskar Range, during the summer 2009. The subsequent experiments on the biomass fuel properties were carried out in the Czech Republic.

In order to acquire data on the dung-as-a-fuel usage, one of the most remote villages in Indian Himalayas was visited. The inhabitants were asked questions related to the resource of heat energy that is widely utilised here — the dried excrements of domestic animals. The focus was on the techniques of collection, storage and on the qualities of the different types of dung used. The amounts of dung burned daily were measured as well. The data obtained were used to estimate the total amount of dung used per capita per year. Supposing the energetic value and the efficiency of energy transformation to its usable form, the total amount of energy needs for cooking and heating may be quantified.

A few samples of different types of dung were brought to the Czech Republic in order to conduct experiments including fuel properties and biogas production analysis. The different types of dung were divided into 3 groups according to the taxonomic group of animal. Samples of dung were collected in the Czech zoos as well. The results of the fuel properties analysis (calorific value, volatile combustible matter, ash properties, element analysis) will be presented, as well as the results of biogas production potential

The direct measurements showed that the daily fuel consumption during summertime of a wealthy family to be 11,29 kg on average, that is 1,13 kg per capita per day. The average family consumes 6,93 per kg per day, that is 1,38 per kg per capita per day. The average all year-round fuel and heat energy consumption was enumerated as $3,87 \pm 1,35$ kg per capita per day and $12,24 \pm 4,3$ MJ per capita per day, respectively. The fuel dung calorific value ranges from $11,08 \text{ MJ kg}^{-1}$ to $16,29 \text{ MJ kg}^{-1}$ depending on the origin and “type” of the dung examined. The biogas potential seems to be the greatest for the family equidae.

Keywords: Biogas, biomass combustion, energy needs, fuel dung, yak dung