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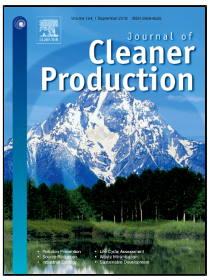

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Developing emission factors for dairy cow enteric fermentation in Korea

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Abstract

We developed emission factors for dairy cow enteric fermentation in Korea, along with their uncertainties. A total of 30 dairy cow farms were randomly chosen from the 3500 possible farms, then data on the number of heads, their body weights, the amount of feed intake, and the feed composition were collected. Statistical analysis of the methane conversion factor (Ym) and gross energy (GE) data showed that the emission factor for the enteric fermentation of a cow should be estimated using three different body weight classes (equivalent to the growth phases). The EF values for the three classes, A, B, and C in this study were greater than those recommended by the 2006 IPCC guideline by 2.3%, 78.5%, and 7.6%, respectively. The Monte Carlo simulation (MCS) and bootstrap method were used to estimate emission factor uncertainty, and the results showed that the bootstrap method gave smaller confidence interval (CI) width and a smaller percentage uncertainty (U). Treating Ym as constant leads to underestimation of the uncertainty of the emission factors, compared to treating Ym as a random variable. Thus, estimation of the emission factors and their uncertainties should be based on an emission factor calculation model where both Ym and GE are treated as random variables.

Keywords

GHG emission factor, enteric fermentation, dairy cow, uncertainty, bootstrap method, Ym, gross energy

1. Introduction

The Paris Accord of December 2016 is expected to affect climate change or greenhouse gas (GHG) emission policies of the world such that all industrial sectors, including the agricultural sector, may need to revise their emission targets and abatement strategies. The