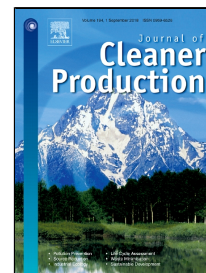


Accepted Manuscript

Developing emission factors for dairy cow enteric fermentation in Korea

Joo Young Lee, Min Hyeok Lee, Jong Seok Lee, Yoon-Young Chun, Kyoung Hoon Kim, Min Seok Kim, Kun Mo Lee



PII: S0959-6526(18)31963-2
DOI: 10.1016/j.jclepro.2018.06.304
Reference: JCLP 13450
To appear in: *Journal of Cleaner Production*
Received Date: 15 November 2017
Accepted Date: 29 June 2018

Please cite this article as: Joo Young Lee, Min Hyeok Lee, Jong Seok Lee, Yoon-Young Chun, Kyoung Hoon Kim, Min Seok Kim, Kun Mo Lee, Developing emission factors for dairy cow enteric fermentation in Korea, *Journal of Cleaner Production* (2018), doi: 10.1016/j.jclepro.2018.06.304

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

1 Developing emission factors for dairy cow enteric fermentation in Korea

2
3 **Joo Young Lee¹, Min Hyeok Lee¹, Jong Seok Lee¹, Yoon-Young Chun², Kyoung Hoon**
4 **Kim³, Min Seok Kim⁴ and Kun Mo Lee^{1,*}**

5 ¹Department of Environmental and Safety Engineering, Eco-product Research Institute, Ajou
6 University, 206 Worldcup-ro, Yeongtong-gu Suwon 16499, Korea

7 ²Advanced LCA Research Group, Research Institute of Science for Safety and Sustainability,
8 National Institute of Advanced Industrial Science and Technology (AIST), 16-1 Onogawa,
9 Tsukuba, Ibaraki, 305-8569, Japan

10 ³Graduate School of International Agricultural Technology, Seoul National University,
11 Pyeongchang, 232-916, Korea

12 ⁴Animal Nutrition and Physiology Team, National Institute of Animal Science, RDA, Wanju-
13 gun, Jeollabuk-do, Korea

14 * Corresponding author: kunlee@ajou.ac.kr, Tel: +82-31-219-2405, Fax: +82-31-219-1613

16 Abstract

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

33 Keywords

34 GHG emission factor, enteric fermentation, dairy cow, uncertainty, bootstrap method, Y_m ,
35 gross energy

37 1. Introduction

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

Download English Version:

<https://daneshyari.com/en/article/8093581>

Download Persian Version:

<https://daneshyari.com/article/8093581>

[Daneshyari.com](https://daneshyari.com)