

Perspective on GHG control towards sustainable animal agriculture

Junichi Takahashi

Obihiro University, Japan

Abstract

Major greenhouse gases attributed to animal agriculture sector are methane (CH₄) and nitrous oxide (N₂O), though carbon dioxide (CO₂) contributes almost half of total greenhouse effect. Rumen CH₄ emission in an enteric fermentation accounts for the biggest anthropogenic source. The abatement mechanism of rumen CH₄ emission may be divided to direct and indirect suppression to methanogens in the rumen. The most significant strategy to mitigate ruminal CH₄ emission in indirect manner is to promote alternative metabolic pathway to dispose of the reducing power, competing with methanogenesis for H₂ uptake. The efficient prebiotics and probiotics have been innovated to mitigate rumen CH₄ emission instead of ionophores in respect to food safety. They are mostly propionate enhancers which consume H₂. They compete with methanogens and eventually abate rumen methanogenesis in indirect manner. However, assimilate nitrate reduction in the rumen which shows strong redox potential is effective to mitigate rumen CH₄ emission without toxic nitrite accumulation when L-cysteine is simultaneously administered. Furthermore, *Escherichia coli* modified genetically has been developed to promote nitrite reduction abating ruminal methanogenesis. Thus, the amplifying competition of metabolic H₂ with probiotics may be a key factor in the regulation of rumen methanogenesis. One of protease-resistant antimicrobial substances has been isolated from *Lactobacillus plantarum* as a direct suppressor of rumen methanogens. The mechanism for accreditation of manipulators must be established to mitigate global CH₄ emission. To mitigate N₂O emission, the ammonia stripping from digested slurry of animal manure in biogas plant was examined to apply to nitrogen recycling-options.

Biography

Junichi Takahashi has completed PhD in 1983 from Kyushu University. He is a Professor emeritus, School of Animal Science, Obihiro University of Agriculture and Veterinary Medicine, a visiting professor of IPB and Tongii University. He worked as a project leader of Japan International Cooperation Agency, visiting professor, National University of Asuncion, Paraguay, The University of Alberta, Canada and The University of Queensland, Australia as a visiting professor. He is a President of International Conference on Greenhouse Gases and Animal Agriculture, GGAA for 2001-Present. He has published more than 140 refereed Journal articles, 32 Books, Scientific Reviews and 43 Patents.