

The 4th International Conference on Recent Advancements in Sustainable Management of Livestock Waste and Rural Environment

(March 27 - 28, 2021)

Abstract Book



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PREFACE

The world population exceeded 7.84 billion people as of January 2021, which is continuing to grow each day and estimated to reach 9.77 billion by 2050. Along with the population growth, sustainable food supply is essential. In most developed and developing countries, the resultant rapid growth of livestock industry has triggered many environmental issues including water, air, and soil pollutions, mainly attributable to the improper or even no treatment of livestock waste.

In Japan, the annual production of livestock wastes is relatively stable at 80 tons during 2015-2020, in which > 80% are dairy and swine wastes. In addition to the efficient and regulatory policies and management, the good practices on livestock wastes resulted in a relatively high utilization ratio of about 87%. However, the livestock industry, especially cattle and pig production, has still been claimed to associate with water pollution, odor problem, energy and resources conservation issues, greenhouse gases (GHGs) emission, etc. in the surrounding rural area.

Thus, more sustainable and advanced technologies for the treatment and utilization of livestock wastes such as high-efficacy methane fermentation, carbonization, recovery as organic fertilizer, etc. are demanded, which can ease the burden of environmental management in rural areas as well. Taking all the above aspects into consideration, not only more advanced treatment and utilization technologies of waste and/or wastewater but also more strict policies and regulations are crucially important for the sustainable management of livestock industry and the betterment of rural environment.

SCHEDULE

17:00 (JST), March 26 (Friday), 2021 End of Registration

March 27 (Saturday), 2021 ~ March 28 (Sunday), 2021 Conference Days

KEYNOTE SPEECH

Prof. Dr. Kiyonori HAGA

Sustainable Recycling of Livestock Wastes by Composting and Environmentally Friendly Control of Wastewater and Odors

Prof. Dr. Renjie DONG

The Treatment and Recycling of Livestock and Poultry Manure and Its Contribution to GHGs Emission Reduction

Prof. Dr. Huu Hao NGO

Insight into Enzymatic Processing in Animal Waste Management

SPECIAL LECTURE

Prof. Dr. Ashok PANDEY How to Write a Scientific Manuscript and Get It Published

ROOM CHAIRS

March 27 (Sat), 10:00 ~ 12:00

Room A: Prof. Kaiqin XU (NIES) & Prof. Weiwei HUANG (HNU) Room B: Prof. Ikko IHARA (KU) & Prof. Lyujun CHEN (THU) Room C: Prof. Kazuya SHIMIZU (UT) & Prof. Chaoxiang LIU (CAS)

March 27 (Sat), 14:00 ~ 16:00

Room A: Prof. Yanwen SHEN (SJTU) & Prof. Xinmin ZHAN (NUI) Room B: Prof. Takeshi MIZUNOYA(UT) & Prof. Donghui WEN (PKU) Room C: Dr. Miyoko WAKI (NARO) & Prof. Zhenhu HU (HFUT)

March 28 (Sun), 10:00 ~ 12:00

Room A: Prof. Wenshan GUO (UTS) & Prof. Wenqiao YUAN (NCSU) Room B: Prof. Helmut YABAR (UT) & Prof. Gang LUO (FDU) Room C: Prof. Jiayang CHENG (NCSU) & Prof. Motoo UTSUMI (UT)

March 28 (Sun), 14:00 ~ 15:45

Room A: Prof. Duu-Jong LEE (NTU) & Prof. Shicheng ZHANG (FDU) Room B: Prof. Yaqian ZHAO (XUT) & Dr. Tian YUAN (NU) Room C: Prof. Weixiang WU (ZJU) & Prof. Zhongfang LEI (UT)

CAS: Chinese Academy of Sciences FDU: Fudan University HFUT: Hefei University of Technology HNU: Hainan University KU: Kobe University NARO: National Agriculture and Food Research Organization NCSU: North Carolina State University NIES: National Institute for Environmental Studies NTU: National Taiwan University NU: Nagoya University NUI: National University of Ireland Galway PKU: Peking University SJTU: Shanghai Jiaotong University THU: Tsinghua University UT: University of Tsukuba UTS: University of Technology Sydney XUT: Xi'an University of Technology ZJU: Zhejiang University

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K1- Sustainable Recycling of Livestock Wastes by Composting and Environmentally Friendly Control of Wastewater and Odors

OKiyonori Haga*

Technical Expert of Livestock Waste Management, Livestock-Industry's Environmental Improvement Organization (LEIO), Tokyo 105-0001, Japan *Corresponding author. Email: haga@leio.or.jp

Abstract: Excess amounts of livestock wastes are excreted in limited area and cause pollution problems in Japan. Comparative studies on livestock waste management among EU, US and Asia including Japan are surveyed. In Japan, livestock wastes are mostly separated into solid and liquid matter. Solid matter is converted into organic fertilizer by means of composting. Composting should be developed into the technology that has low emission, high-quality and low cost. Various odorous compounds are emitted from the process of livestock waste management. Odor emission from livestock farms should be mitigated to protect the local community. High-quality compost can be widely distributed to cropland to decrease expenditure of chemical fertilizer. Although liquid matter, namely wastewater or slurry, could be applied to cropland of livestock farms such as EU countries, most of Japanese farms do not have enough cropland to use liquid matter. Particularly pig farms have no area to spread wastewater, which should be purified to clean water in accordance with the criteria of water quality and could be discharged into public water area. The most desirable management of livestock wastes should involve sustainable recycling as compost and environmentally friendly control of odors and wastewater.

Keywords: Livestock wastes; Compost; Odor; Wastewater





Prof. Kiyonori Haga

Prof. Kiyonori Haga is currently a technical expert of Livestock Waste Management, Livestock Industry's Environmental Improvement Organization (LEIO), Japan. He obtained both Bachelor (1971) and Master (1973) degrees at the Department of Agricultural Biological Chemistry, Tokyo University of Education, and got his Ph.D. in Agricultural Engineering at University of Tsukuba in 2001. Right after his Master's program, he as a researcher worked in the Laboratory of Animal Waste Management, National Institute of Animal Industry (NIAI), Ministry of Agriculture, Forestry and Fisheries (MAFF), and became a Senior Scientist in 1983. Prof. Haga was the Chief in the Laboratory of Animal Waste Recycling, NIAI, MAFF since 1993. During 2005-2009, he was the Director of Department of Animal Waste Management, National Institute of Livestock and Grassland Science (NILGS), National Agriculture and Food Research Organization (NARO). Besides being as a technical expert of livestock waste management, LEIO since 2009,

Prof. Haga has been a visiting professor in Animal Waste Management, School of Veterinary Medicine, Azabu University during 2006-2019. Prof. Haga has a strong research interest and rich experiences in animal waste management, and he is also very active in scientific research and academic fields. In addition to more than 50 publications in domestic and international journals, Prof. Haga as an editor and/or co-editor published 5 books. Prof. Haga delivered many keynote speeches in international conferences and workshops, especially in Asian countries, contributing himself to the sustainable development of livestock industry.

K2- The Treatment and Recycling of Livestock and Poultry Manure and Its Contribution to GHGs Emission Reduction

ORenjie DONG*

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Abstract: Climate change mitigation is one of the key global concerns and should become one of the key global actions. It is statistically concluded that emission is the result of economy development mainly because of energy consumption. However, the technologies are almost ready to support low-carbon economy. Unfortunately, by now there are less cost-effective technologies to "capture" carbon and to generate "negative" carbon to "neutralize" global emission before the temperature reaches the 2 centi-degrees rise. Animal production is the main source of greenhouse gases (GHGs). Fortunately, according to the emission assessment methodology, based on the commonly admitted baseline, the anaerobic treatment of agricultural biowastes, mainly animal manure, can produce "negative" carbon emission with acceptable cost. Taking China as an example, the rural and agricultural biowastes cause about 75% of chemical oxygen demand (COD) and total nitrogen (TN) pollution in the waters. The annual animal manure amounts to about 2.8-3.8 billion tons. If all the manure is treated in biogas plants, it will have potential 80-110 billion m3 biogas and 200-300 million tons of CO_{2e} negative emission. Compared to the net annual CO_{2e} emission of 10 billion tons in China in 2019, manure biogas plants can contribute 2-3% to the carbon neutralization. This talk will focus on manure generation, collection, biogas technology, GHGs emission accounting methodology and its use in biogas plants assessment.

Keywords: Manure waste management; Biogas; Greenhouse gases emission; Accounting





Prof. Renjie Dong

Dr. Renjie Dong is currently a Professor at the College of Engineering, China Agricultural University (CAU). He obtained Bachelor (1985) and Master's (1988) degrees at Shandong Agricultural University and Beijing Agricultural Engineering University, respectively. In 1997 Prof. Dong got his PhD degree at China Agricultural University. Prof. Dong has spent 32 years in the education, research and technology extension on Bioenergy and Environment Science and Technology (BEST) since 1988. He is the PI for more than 20 research projects from the ministries of Science and Technology, Agriculture, Environmental Protection, and some provinces and municipal cities. He leads the excellent research teams in both Beijing City and Shandong Province for BEST research with two more professors, 14 associate professors and 42 postgraduates. His research interests include: (1) organic waste to bioenergy and fertilizer, (2) biomass cookstoves testing and certification, (3) for constructed wetlands organic wastewater (4) treatment, environmental impacts and contributions assessment from bioenergy engineering, and (5) agricultural development in developing countries. Prof. Dong is very active for academic international collaborations with developed and developing countries. He has been the RAC (Research Advisory Council) member of German Bioenergy Research Center (DBFZ) since 2014, and becomes the international co-chair of RAC for the term of 2020-2024. He is an ISO TC member of ISO 255 (biogas) and 285 (household stoves). He set up the Great Cycle platform for organic waste treatment and renewable resources recovery, and set up and has been the Chairman of Forum of Renewable Energy Promotion in Developing Countries (FREPDC) since 2001. Moreover, he organized 15 training programs for 300 scientists and technicians from developing countries, the network for Chinese agricultural universities to support Africa in agricultural development (AfriCAU) and for a south-south sustainable stove experts group to promote the clean stove in developing countries (S4G) were created in 2005 and 2013, respectively. Prof. Dong has published more than 300 quality articles in international and domestic journals, and holds more than 20 patents. He won the second National Prize of Science and Technology Progress and MoA Second Prize.

K3- Insight into Enzymatic Processing in Animal Waste Management

OHuu Hao Ngo*

Centre for Technology in Water and Wastewater, School of Civil and Environmental Engineering, University of Technology Sydney, Sydney, NWS 2007, Australia *Corresponding author. Email: ngohuuhao121@gmail.com

Abstract: Huge amounts of wastes from livestock and poultry industries have aroused environmental and public health concern worldwide. Proper management technologies are therefore required for waste reduction and reutilization. Enzymatic processing has been considered an interesting technology as enzymes are a part of valuable products from animal wastes while playing important roles in the process of waste bioconversion. Since animal wastes contain protein keratin, collagen and fat, they can be used as substrates for the growth of enzyme-producing bacteria to produce enzymes. In addition, enzymes promote the biodegradation of animal waste to reduce the environmental pollution, and improves the production of bioenergy and valuable products. This study reviewed the production of enzymes from animal wastes under the function of specific microorganisms. The feedstock, bioconversion processes and impact factors for the enzyme production were discussed. The application of enzymes for animal waste management were also critically reviewed with respect to: (i) utilization in animal waste degradation, (ii) nutritional value improvement of animal wastes as feed, and (iii) bioenergy production and value-added products.

Keywords: Enzyme; Animal waste; Bioconversion; Bioenergy; Value-added products



Prof. Huu Hao NGO (Ngo) is currently a Professor of Environmental Engineering and serving as Deputy Director of Centre for Technology in Water and Wastewater and Co-Director of Joint Research Centre for Protective Infrastructure Technology and Environmental Green Bioprocess, School of Civil and Environmental Engineering, Faculty of Engineering and Information Technology, University of Technology Sydney. He has been duly elected as Fellow of International Water Association (FIWA) and Fellow of the International Bioprocessing Association (FIBA), and Chairman of the International Bioprocessing Association. Ngo's main areas of expertise include advanced biological waste treatment processes, membrane separation technologies; alternative resources, management and impacts assessment, and solid waste management. Ngo also focuses on developing green technologies for sustainable development for resource recovery, water-waste-bioenergy nexus, and greenhouse gas emission control. Ngo has received several important national and international awards/honors such as Clarivate Analytics, Prof. Huu Hao Ngo Web of Science Highly Cited Researcher 2020 in the category of Biology and Biochemistry Category; Clarivate Analytics, Web of Science Highly Cited Researcher 2019 in Cross Field Category; Mendeley Data top Cited Researchers in the world, 2020; Top 1 in Australia and Top 3 in the world in the field of Environmental Engineering (2015-2020) - SciVal (Elsevier 5-year ranking); Top 1 in Australia and Top 5 in the world in Bioengineering (2015-2020) - SciVal (Elsevier 5-year ranking); Top 1 in Australia and Top #13 in the world in Renewable Energy, Sustainability and the Environment (2015-2020) - SciVal (Elsevier 5-year ranking); Leader in Environmental Science 2020 (THE AUSTRALIAN- RESEARCH yearly ranking); Leader in Biotechnology in Australia, 2019 (THE AUSTRALIAN- RESEARCH yearly ranking) etc. Ngo has more than 600 publications including 12 books and 35 book chapters, 5 patents with h-index of 76 and citation of > 25,000 (Google, 02/2020). He has been invited for giving numerous plenary/keynotes and invited talks, seminars, and lecturers in the international conferences as well as the universities/research institutions. He has also been Honorary Distinguished Professor, International Guest/ Chair professor, Visiting Research Fellow in France, China, India, Korea, Japan, Taiwan, Thailand, and Vietnam etc. while being Conference Chair, Section Chair, and Advisory/Organizing/Scientific committee member in a number of conferences. Ngo has appointed as Editor of Bioresource Technology, Elsevier, Associate Editor of Science of the Total Environment, Elsevier, Associate Editor of Journal of Water Process Engineering and Associate Editor of Heliyon Journal, Elsevier.

Special Lecture

Special Lecture

S1- How to Write a Scientific Manuscript and Get It Published

OAshok Pandey*

Centre for Innovation and Translational Research, CSIR-Indian Institute of Toxicology Research **Corresponding author. Email: ashokpandey1956@gmail.com*



Prof. Ashok Pandey

Dr. Ashok Pandey is currently the Distinguished Scientist at the Centre for Innovation and Translational Research, CSIR-Indian Institute of Toxicology Research, Lucknow, India and Executive Director (Honorary) at the Centre for Energy and Environmental Sustainability - India. Formerly, Prof. Pandey was the Eminent Scientist at the Center of Innovative and Applied Bioprocessing, Mohali and Chief Scientist & Head of Biotechnology Division and Centre for Biofuels at CSIR's National Institute for Interdisciplinary Science and Technology, Trivandrum. His major research and technological development interests are industrial & environmental biotechnology and energy biosciences, focusing on biomass to biofuels & chemicals, waste to wealth & energy, industrial enzymes, and so on. Prof. Pandey is also the Adjunct/Visiting Professor/Scientist in universities in France, Brazil, Canada, China, Korea, South Africa, and Switzerland and several universities several in India as well. He has ~1450 publications/communications, including 16 patents, 95 books, >700 papers and book chapters with h index of 106 and >50,000 citations (Google Scholar). He has transferred four technologies on industrial enzymes to industries and has done industrial consultancy for about a dozen projects for Indian/international industries. Prof. Pandey is the recipient of many national and international awards and honors, including Highest Cited Researcher (Top 1% in the world), Clarivate Analytics, Web of Science (2020, 2019 & 2018), Top Scientist in Biotechnology (No. 1 in India and No. 8 in the world), Stanford University world ranking (2020), Fellow in World Society of Sustainable Energy Technologies (2020), Fellow in Indian Chemical Society (2020), etc. In addition, Prof. Pandey is the Founder President of the Biotech Research Society, India; Founder & International Coordinator of International Forum on Industrial Bioprocesses, France; Chairman of the International Society for Energy, Environment & Sustainability; Editor-inchief of Bioresource Technology; Honorary Executive Advisor of Journal of Energy and Environmental Sustainability, Journal of Systems Microbiology and Biomanufacturing), Journal of Environmental Sciences and Engineering, etc. and editorial board member of several international and Indian journals.



