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PREFACE

LivestockWaste 2016- International Conference on Recent Advances in Pollution Control and Resource Recovery for the Livestock Sector

Xinmin Zhan (✉)[1], Liwen Xiao[2]

1 Civil Engineering, College of Engineering and Informatics, National University of Ireland Galway, Ireland
2 Department of Civil, Structural and Environmental Engineering, Trinity College Dublin, Ireland

Globally, more than 55 billion tonnes of manure are generated every year from the livestock sector. However, livestock manure management systems, consisting of storage, processing, transportation, and disposal, are often inadequate, both in developed and developing countries.

Land application is currently the major disposal approach for animal manure because of its high nutrient (nitrogen (N), phosphorus (P) and potassium (K)) contents. Unfortunately, inappropriate manure management may lead to adverse environmental issues. Approximately 35%–40% of global anthropogenic methane (CH_4) emissions are associated with the livestock sector – from animal houses, storage ponds and tanks, and manure applied lands. Livestock manure also impacts surface and ground water quality. According to the First National Survey on Water Pollution Sources issued by China's Ministry of Environmental Protection, the Statistics Bureau and the Ministry of Agriculture, the total chemical oxygen demand (COD), total nitrogen (TN) and total phosphorus (TP) discharged to water bodies from the livestock sector in 2007 comprised 42%, 22% and 38% of the total COD, TN and TP discharged to the water environment in the whole country.

Manure contains emerging contaminants, such as antibiotics and metals. China, the biggest user of antibiotics in the world, is combating the environmental problems caused by misuse of antibiotics. In 2013, the total usage of antibiotics was approximately 162,000 tonnes, of which 52% was used on animals. These antibiotics are often poorly absorbed by animals, with 30%–90% of doses excreted in manure and transported to soil. Antibiotics can promote antibiotic resistance genes (ARGs; for example, resistance genes to tetracyclines (*tet*B(P), *tet*M, *tet*O, *tet*W) and sulphonamides (*sul*I*, sulII, sul*III*, and sul*A)). High concentrations of metals such as zinc and copper are also found in manure, and may promote the occurrence of metal resistance genes (MRGs). Improper management of manure would disseminate ARGs and MRGs to the surrounding soil, water and plants, before transmission to animals and humans through the food chain, posing public health risks. It is estimated that 25,000 and 4,730,000 deaths annually are associated with antibiotic resistance in the EU and Asia, respectively.

The high nutrient values of livestock manure make it a potentially valuable resource. Manure is an excellent feedstock for biogas generation. The yielded biogas converted from biodegradable organic matter mainly consists of CH_4 and carbon dioxide (CO_2), and can be used to generate heat and electricity. It can replace natural gas, and can be injected into the gas grid or used as a vehicle fuel after biogas upgrading. Manure is an excellent organic fertilizer after composting or

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✉ Corresponding author
E-mail: xinmin.zhan@nuigalway.ie

*Special Issue—Livestock Waste Management and Resource Recovery (Responsible Editors: Xinmin Zhan & Liwen Xiao) anaerobically digestion, due to its high N, P and K concentrations. The production of biogas and the use of organic fertilizer would reduce CO_2 footprints, and mitigate pollution to water, soil and air. Innovative technologies to control pollution and recover resources from livestock manure are universal demands among farmers, agricultural industry, researchers, and governments.

This special issue contains papers that were delivered at the LivestockWaste 2016 conference, which was held in the National University of Ireland Galway in the Republic of Ireland from 10th to 12th August 2016. This conference provided an opportunity for researchers and industry stakeholders to gather together, share their experiences on R&D, and to seek solutions for the environmental issues associated with the management of livestock waste. The topics of the special issue included 1) technologies for waste prevention and pollution control, 2) technologies for resource recovery, 3) greenhouse gas emissions, and 4) emerging contaminants.

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