

# **International Science & Technology Innovation Program of the Chinese Academy of Agricultural Sciences (CAASTIP)**

**Project Title: Safe and value-added utilization of animal manure and mitigation of gas emissions**

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**Leading Agency:** Institute of Environment and Sustainable Development in Agriculture (IEDA), CAAS

**Chinese agencies involved:** Institute of Agricultural Resources and Regional Planning (IARRP), CAAS; Peking University; Research Center for Eco-Environmental Sciences (RCEES, CAS)

**Foreign agencies involved:** CGIAR, CCAC, WUR, ATB, BU, UT, NZAGRC, INRAE

**Project Investigator:** Dong Hongmin

# Project objectives

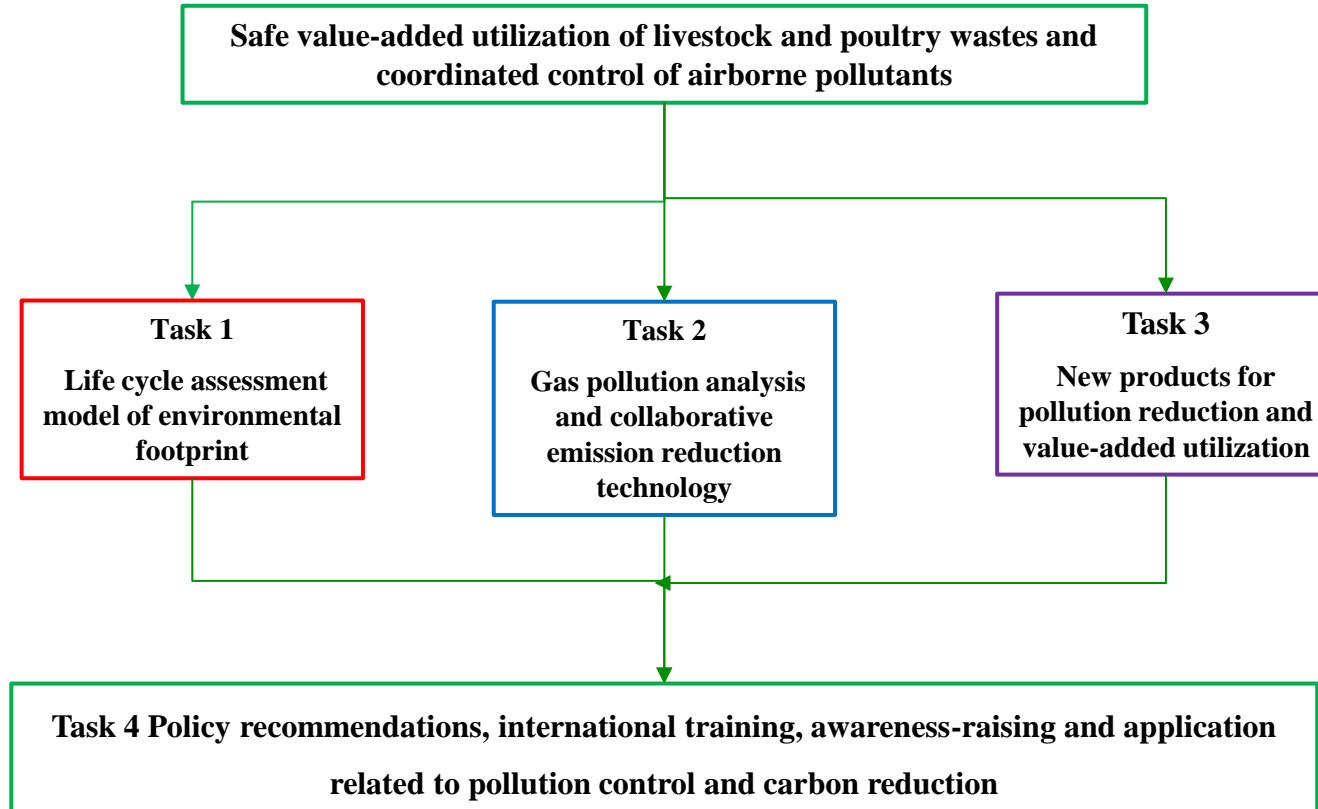
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The objective of the collaboration project is to tackle low efficiency of manure treatment and utilization, promote mitigation of gas emissions (GHG, odor, ammonia and bio-aerosol) which are global concerns, and control of key emerging pollutants (antibiotics, resistance genes and anti-epidemic disinfectant residues). Specific objectives are as follows:

- Develop the monitoring and evaluation method of lifecycle environmental footprint;
- Identify characteristics and control technologies of airborne pollutant emissions in the livestock sector;
- Develop eco-friendly technologies and products for safe utilization and biodegradation of wastes;
- Enhance research capacity in livestock environment through sharing knowledge and experience

# Project ideas and components

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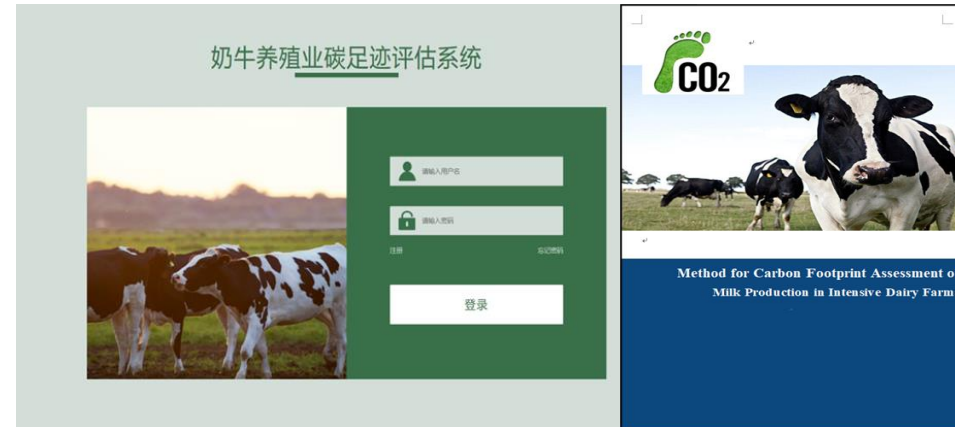


# Main progress in 2021

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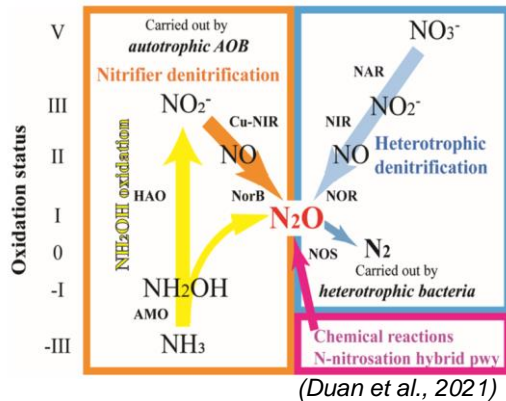
## Collaborated with WUR and GIEAM team of FAO

- ❑ Established model framework of life cycle environmental footprint (nitrogen footprint, carbon footprint, and water footprint) (LEAD-C)
- ❑ Finished and tested the carbon footprint model and software, it is used to
  - estimate current GHG emissions
  - scenario analysis of GHG emission reduction
- ❑ Model comparison is going on

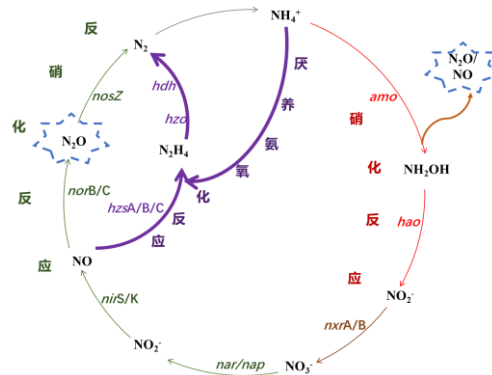


# Main progress in 2021

- Identified the mechanism of Anammox for reducing manure treatment cost and  $N_2O$  emissions



Pathways of  $N_2O$  emissions of traditional sewage treatment



Mechanism of zero  $N_2O$  production in Anammox reaction

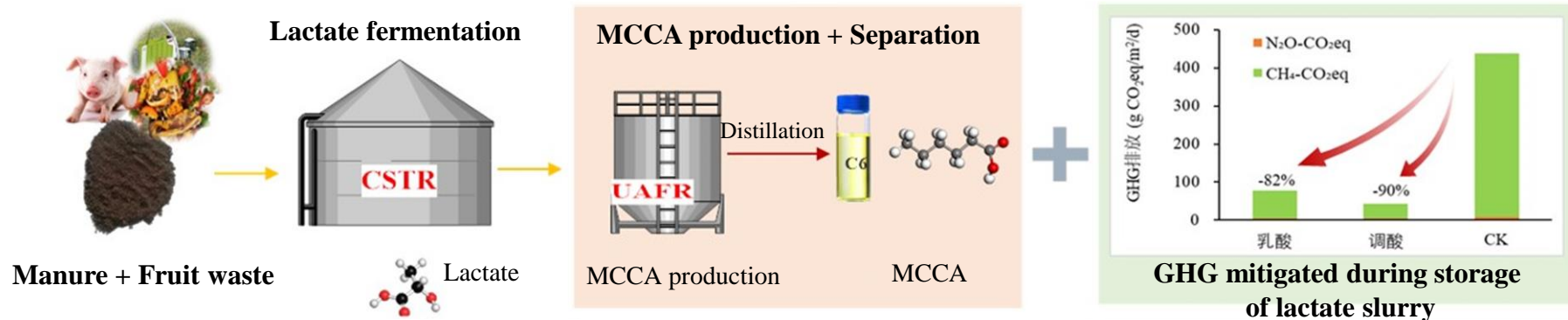


Publish papers IF=13.7

# Main progress in 2021

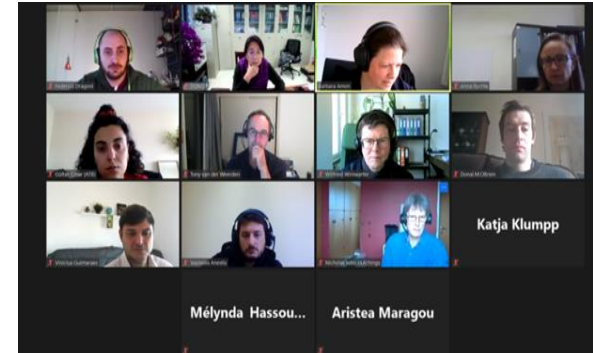
**Collaborated with ATB and Bangor University, developed technology of producing lactic acid from poultry and livestock manure, realized the value-added utilization and gas emission reduction**

- ❑ Identified mechanism and technological parameters for fermentation of lactic acid from mix of manure and other agricultural waste
- ❑ Medium-chain fatty acids (MCFA), long-chain fatty acids (LCFA) and degradable material PHA with lactic acid was produced in laboratory
- ❑ GHG emission reduction by 80%



# Policy recommendation and international cooperation

- ❑ **Participated in the formulation of national emission reduction and carbon sequestration implementation plans in the agriculture and rural sector**
  - Estimated current and future GHGs emissions from the livestock sector
  - Assessed emission reduction potential
  - Determined technology pathways for GHG mitigation in livestock sector
  
- ❑ **Provided technical support for update China's NDC**
  - Participated in the COP26 negotiation on agricultural issues
  - Submitted agriculture-related information to national focal point on update of NDCs



Join the Board member meeting of EU milky project



Participation in COP26 negotiations