

ENVIRONMENTAL MANAGEMENT OF PIG EXCRETA IN KOREA

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Contents

- Introduction
- Current Status of Pig Rearing in Korea
- Environmental Impacts of Excreta
- Livestock Excreta Management
- Conclusions



INTRODUCTION



Purposes

- Describing current situation of pig rearing via statistics in Korea
 - Number of pigs, pig production, size of farms
- Presenting various impacts of intensive livestock farming on the multi-media environment
 - Addressing issues on pig excreta management
- Introducing efforts to manage livestock excreta in Korea

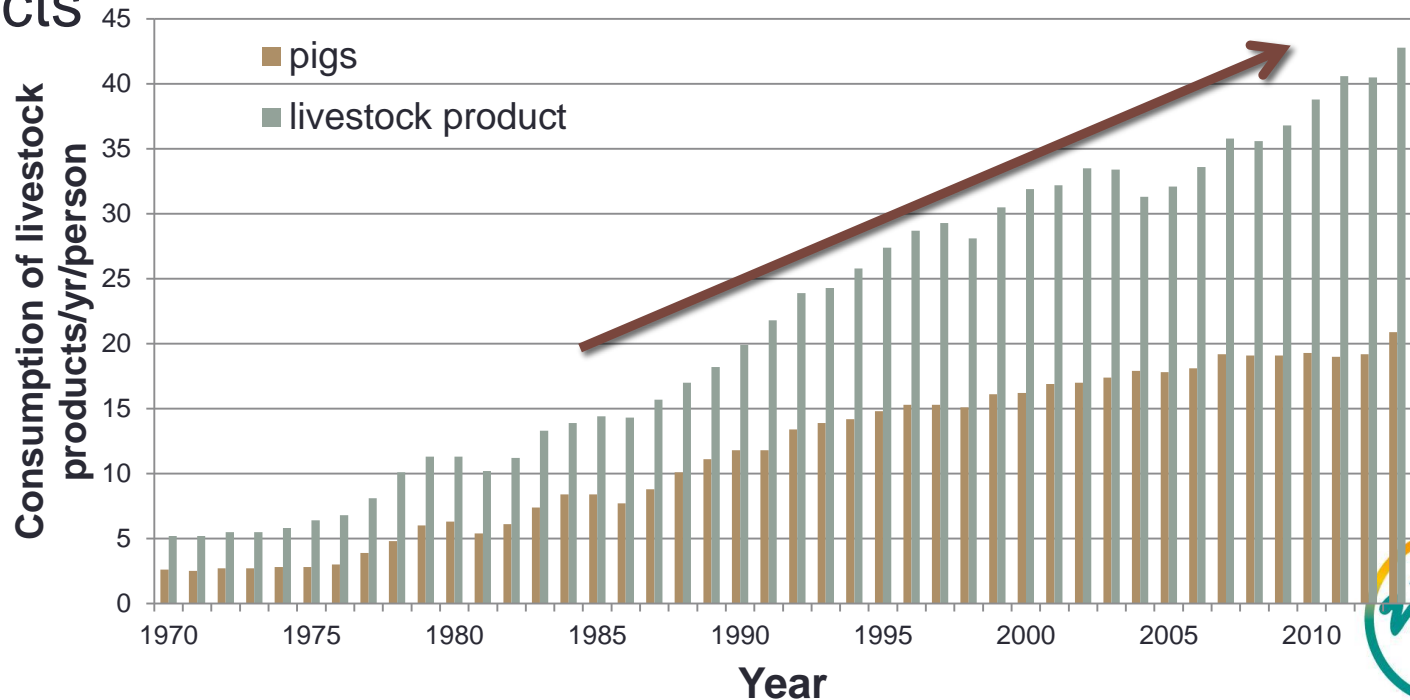


CURRENT STATUS OF PIG REARING IN KOREA



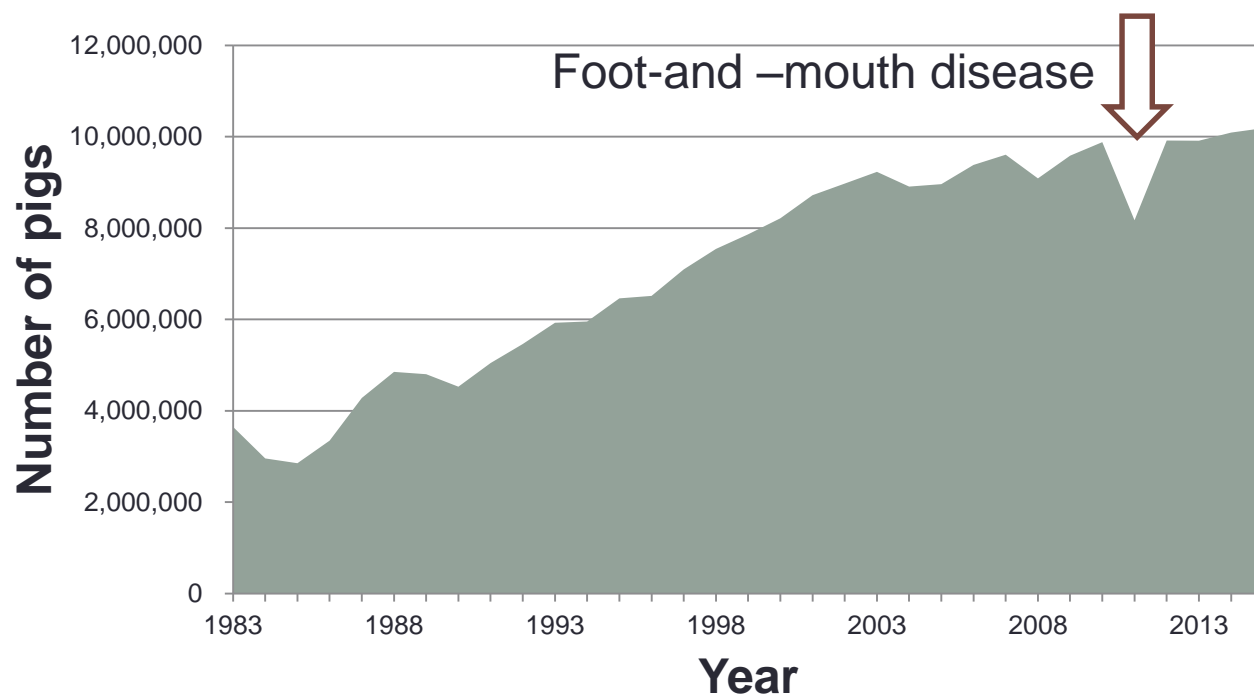
Current livestock status in Korea

- Farming dominated by family run businesses
- Until 70's, only part of the activities of a mixed farm
 - Crops were grown and different animal species were kept
- Since 80's, Increase of market demands of livestock products



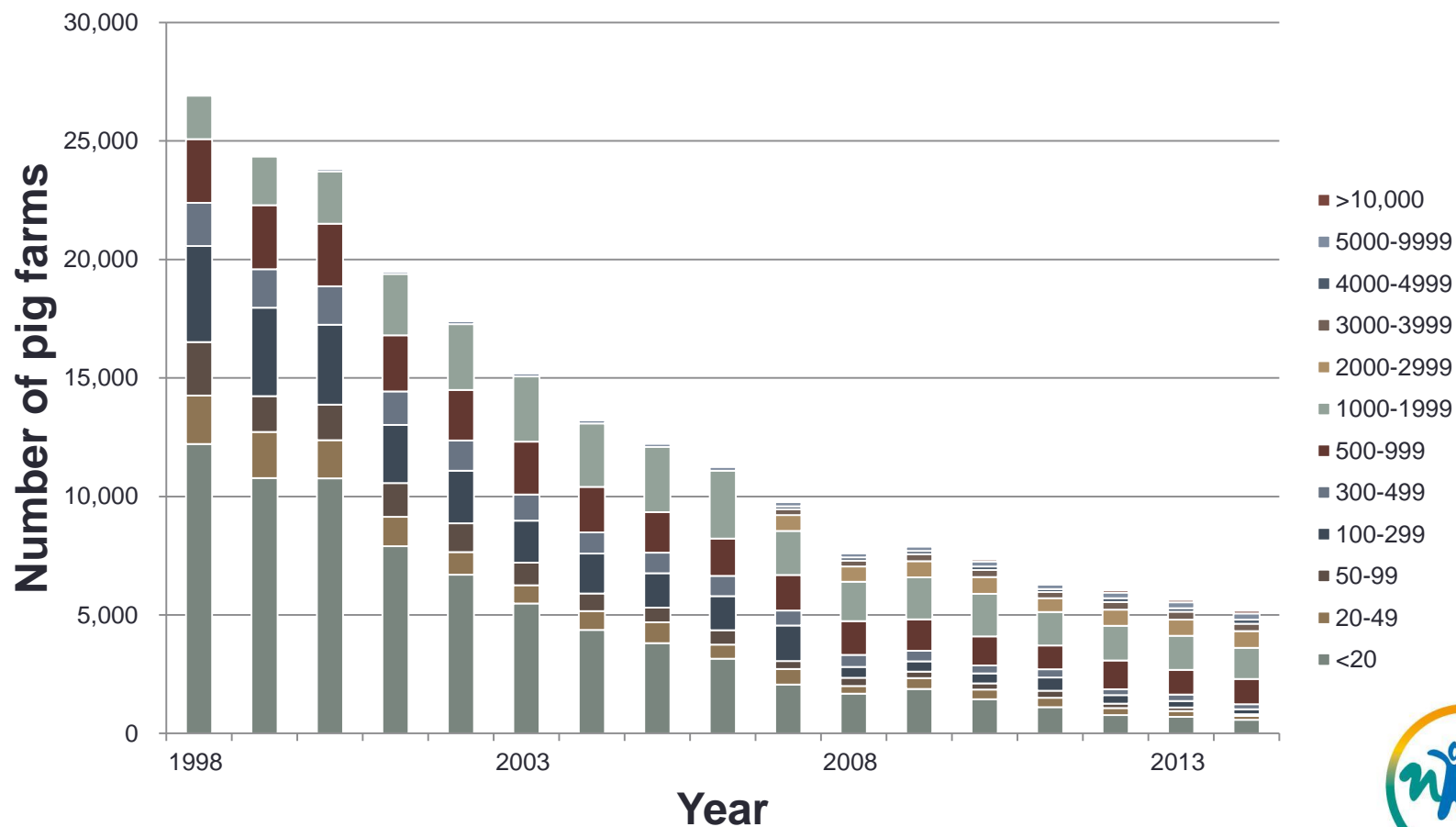
Current status of pigs in Korea

- Specialization of farmers and commercialization of farms due to increase of market demands
- As a consequence increase of animal numbers and farm sizes



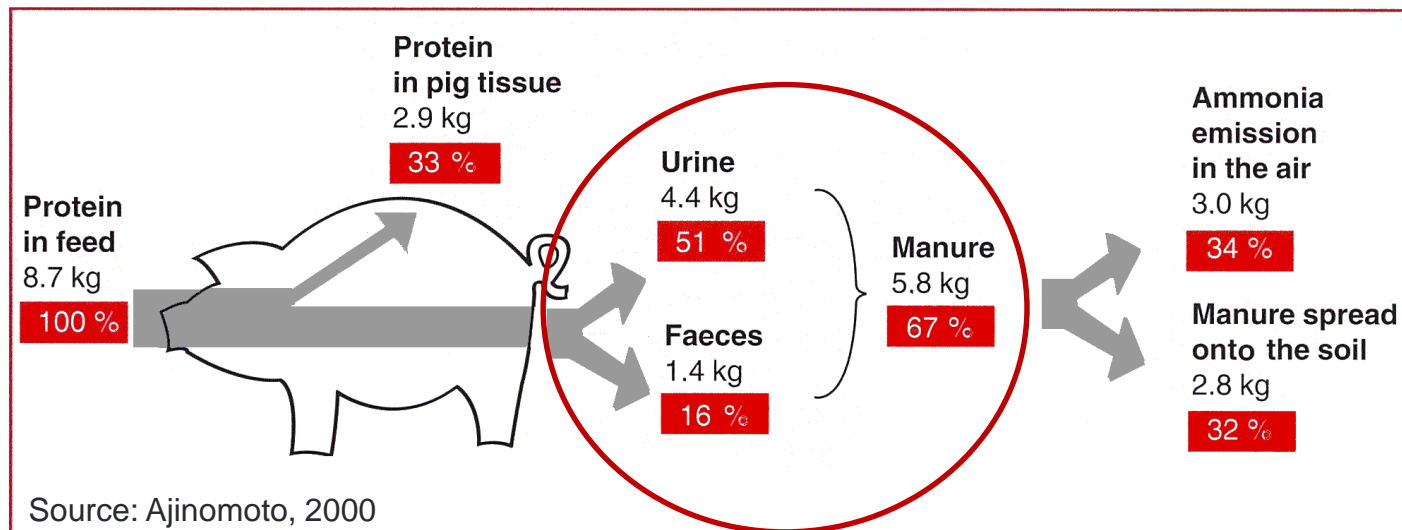
Current status of pigs in Korea

- Intensive livestock farming



Key on-farm environmental aspect

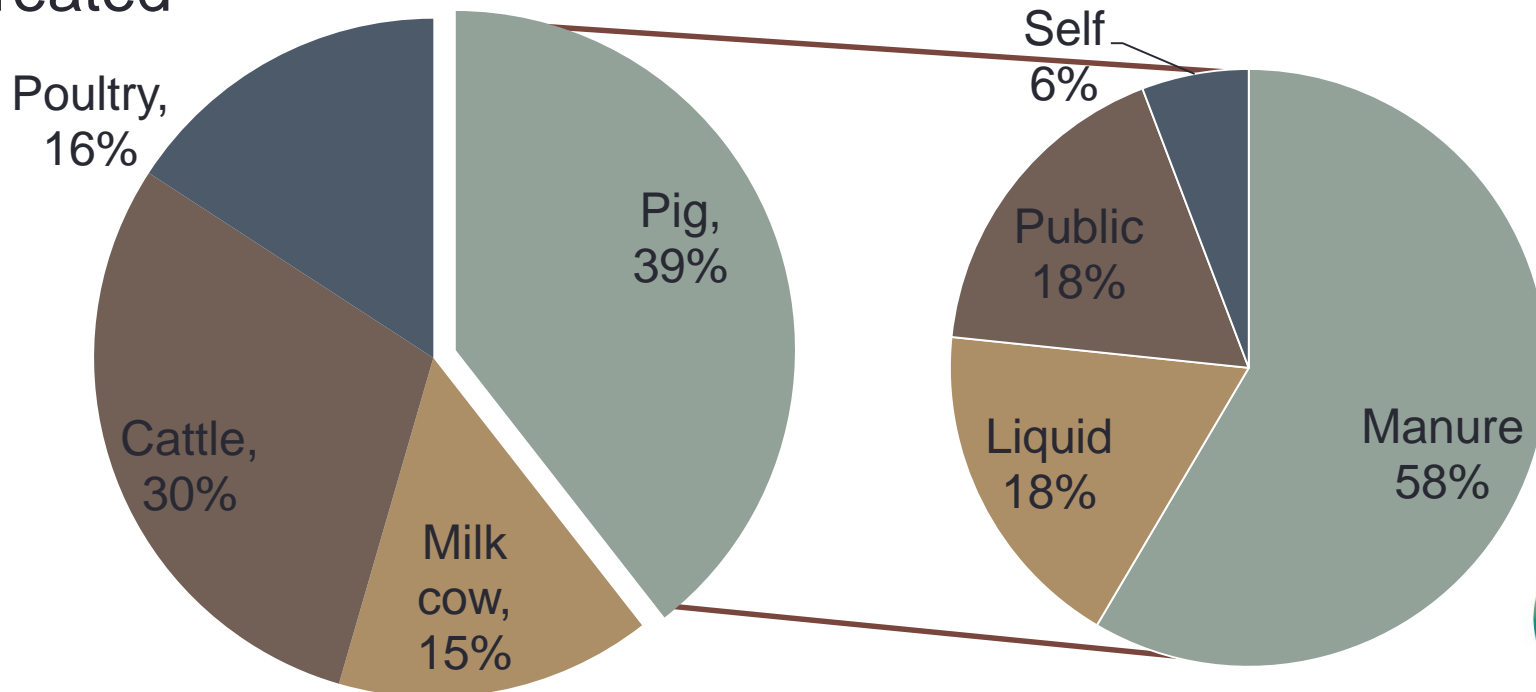
- Related to the natural living processes
- Much of the nutrients via excreta
 - Nitrogen consumption, utilization and losses in the production of a pig for slaughter with a final live weight of 108 kg



- Excreta from intensive livestock farms vs. environment

Current status of manure treatment

- Total amount of livestock excreta was about 127,000 m³/day in 2014
- Most excreta from milk cow/cattle and poultry was composted into manure while that from pig was variously treated

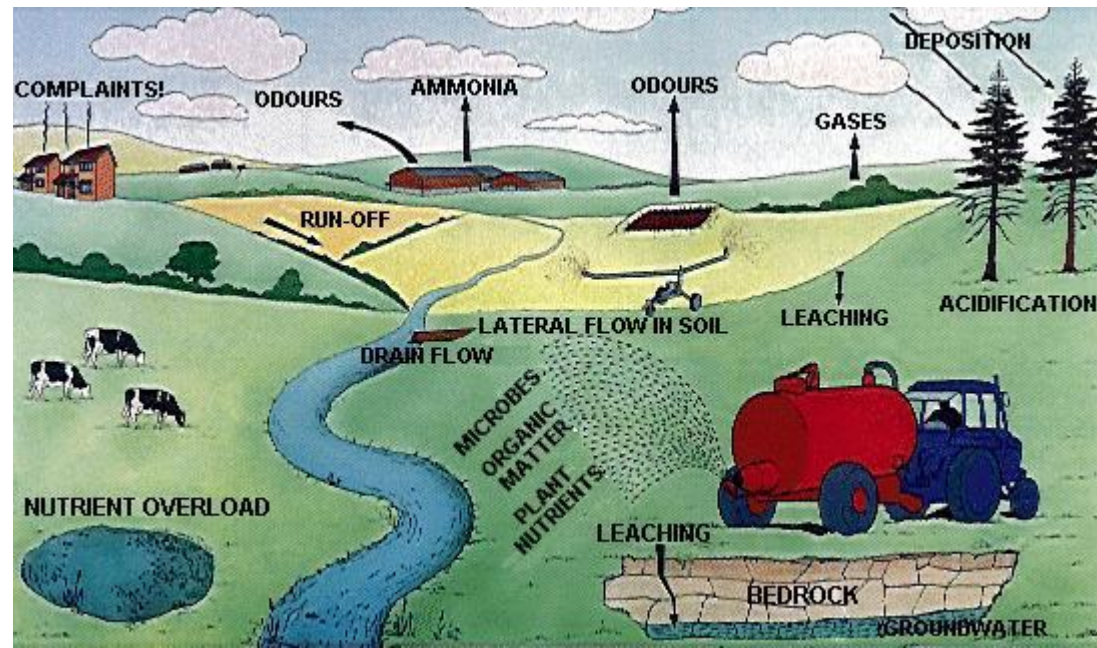


ENVIRONMENTAL IMPACTS



Environmental aspects

- Flow of excreta and nutrients along the whole production chain
- Positive environmental aspects
 - Excreta substituting manufactured mineral fertilizer
- Potential negative environmental aspects



Source: Pahl, 1999

Potential negative environmental aspects

- Surface waters and groundwater pollutions (NO_3^- , NH_4^+)
- Eutrophication (N, P)

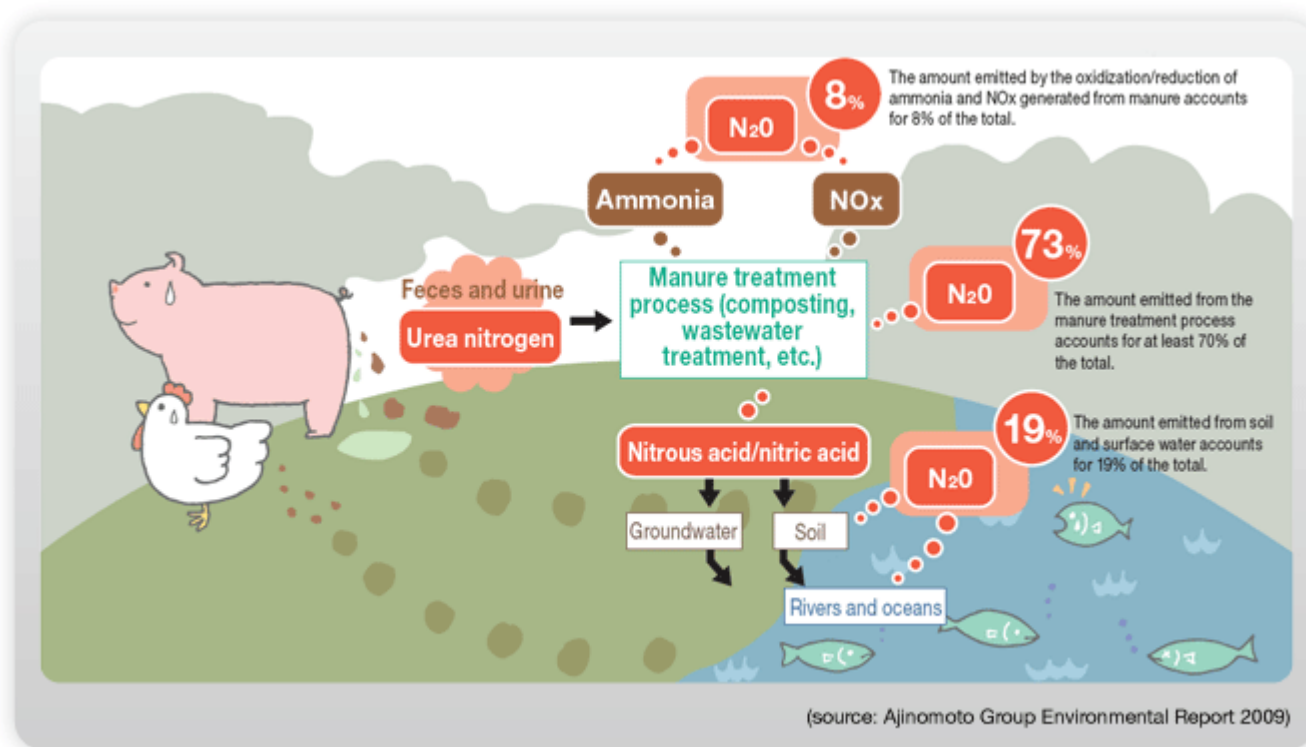


Liquid wastes from intensive pig production in South East Asia (here: Thailand) are seldom utilised and therefore pose a serious threat to the environment.

Photo: H. Menzi

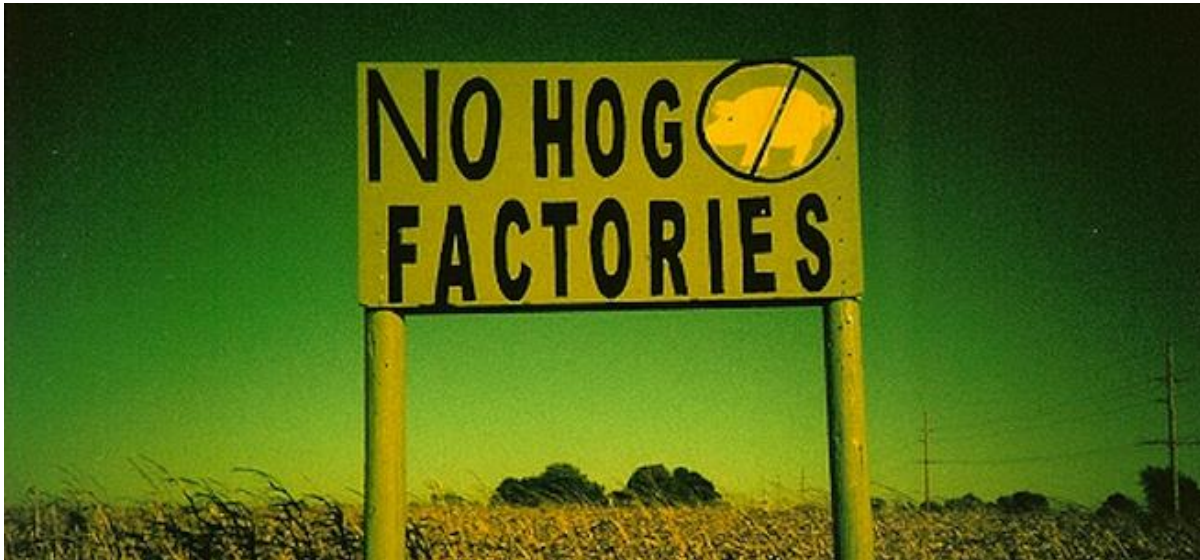
Potential negative environmental aspects

- Acidification (NH_3 mainly, H_2S , SO_2 , NO_x , etc)
- Airborne pollution (NH_3 , N_2O , NO , dust, bio-aerosols, etc)
- Increase of greenhouse effect (CO_2 , CH_4 , N_2O , etc)



Potential negative environmental aspects

- Local disturbance (odor, noise)
 - A lot of filing civil complaints

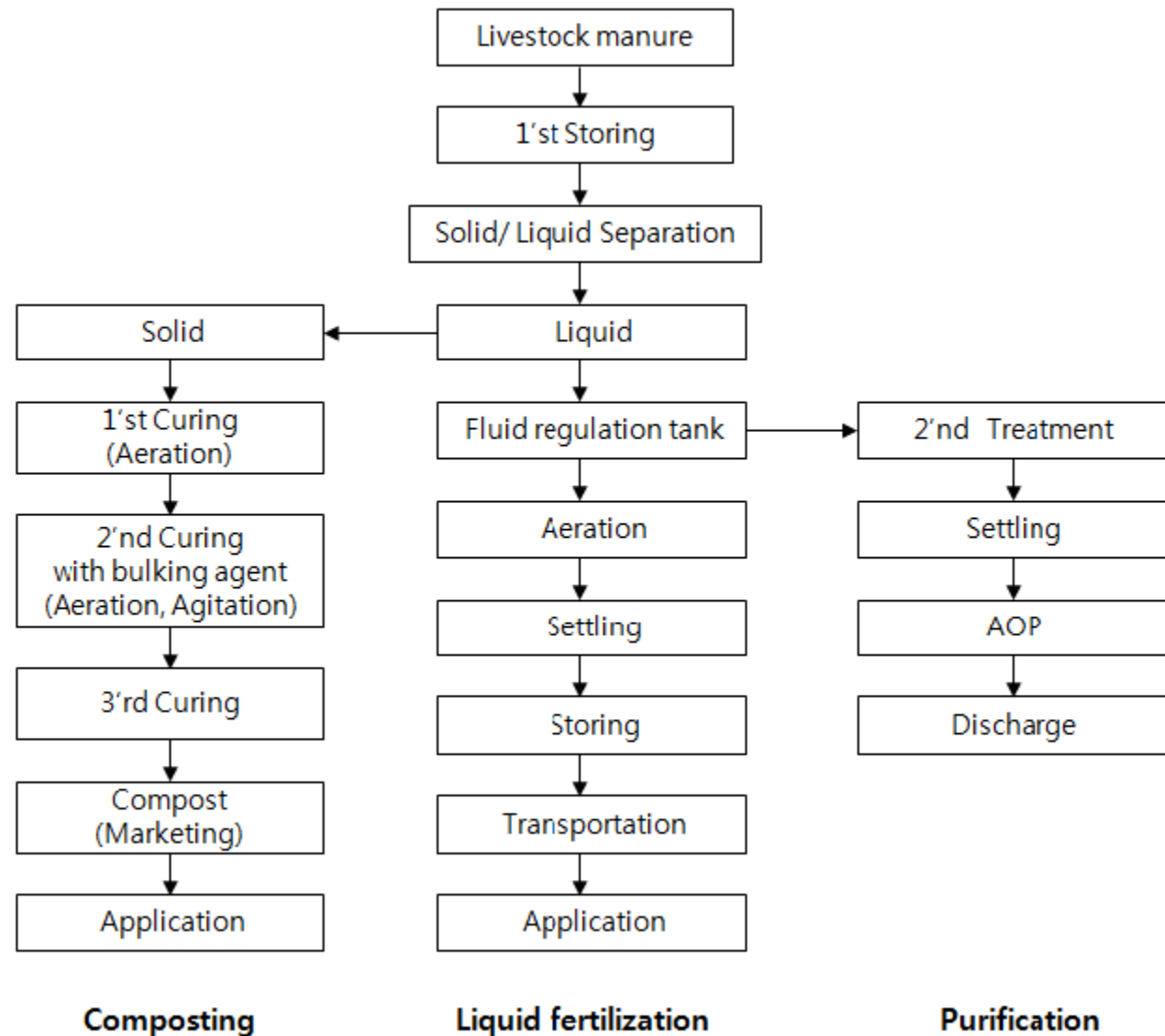


Potential negative environmental aspects

- Diffuse spreading of heavy metals, pesticides and toxic substances
- Spreading of pathogens including antibiotic-resistant pathogens
- Residues of pharmaceuticals in waters



Typical treatment process of excreta

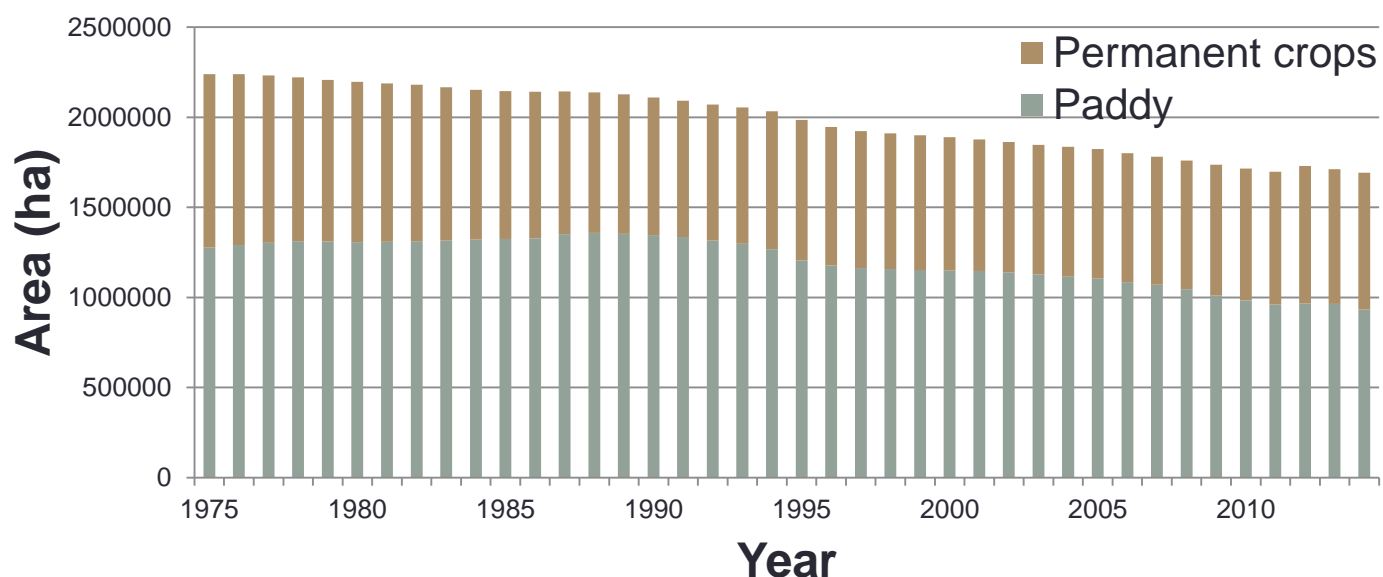


Source: Jeong et al. 2014



Livestock manure in Korea

- About 90% of livestock excreta was composted into manure and liquid fertilization
- But... Not much places to go
 - Agricultural land has decreased



- **No more dumping at sea since 2012** due to London Convention on Prevention of Marine Pollution by Dumping of Wastes and other matter



Issues on intensive livestock management in Korea

1. Issues on excreta management

- Unclear processes of discharge, collection, transportation and treatment of excreta
- Inconsistent quality of manure and liquid manure

2. Issues on pig farming management

- Farmers and operators of facilities under no systematic supervision
- Intensive rearing farms discharging excreta over local environmental capacities
- Unauthorized or undeclared farms supposedly not located in the areas such as 'reserve areas for water services'



LIVESTOCK MANURE MANAGEMENT



Related ministries and in Korea

- Two Ministries mainly responsible for policies of livestock management and use
 - Ministry of Environment (ME)
 - Ministry of Agriculture, Food and Rural Affairs (MAFRA)
- Acts related to livestock management
 - Act on the Management and Use of Livestock Excreta
 - Livestock Industry Act
 - Fertilizer Control Act
 - Environment-Friendly Agriculture Fosterage Act
- ME has changed paradigm of livestock management
 - Considering excreta as resources not just waste
 - Adopting preventive approaches



Legal amendment

1. Issues on excreta management
 - ‘Livestock Excreta Electronic Transfer System’
 - Reinforcement of standards for manure and liquid manure
 - Development of installation standards both of biogas and of solid fuel facilities
2. Issues on pig farming management
 - ‘Livestock Excreta Survey’ for regional environmental capacities
→ for future enactment of Nutrient Management Plan
 - Expansion of livestock restricted areas including water conservation zone, buffer zone and etc.



Livestock Excreta Electronic Transfer System (LEETS)

- Purpose
 - To build clear processes of discharge, collection, transportation and treatment of excreta
- Target
 - Urine and liquid manure of pigs
- How to
 - Tracking tank truck with urine or liquid manure from sources (e.g. pig farm) to places where liquid manure applied by GPS
- Pilot project applications
 - Jeju Island and Saemangeum watershed
- According to 'Act on the Management and Use of Livestock Excreta', the system is planned to be applied to all the nation from 2017



Livestock Excreta Electronic Transfer System (LEETS)

- Electronic transfer procedure

Step1: Discharge



Step2: Collection & Transportation

Weight up

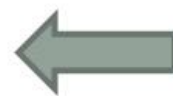
Weight down



Step3: Treatment



Manure



Step4: Liquid manure application



Excreta as resources – manure

- Reinforcement of standards for manure and liquid manure ('14)

	Parameters	Standard
Manure	Cu	< 500 mg/kg
	Zn	< 1,200 mg/kg
Liquid manure	Decay degree	Standards negotiated by ME & MAFRA
	Water contents	> 95 %
	Salt	< 2.0 %
	Cu	< 70 mg/kg
	Zn	< 170 mg/kg

- Appeasement of agricultural area required for application of liquid manure of pig (m²/count) ('10)

Grassland	Paddy	Permanent crop and orchard
> 140	> 260	> 170

Livestock Excreta Survey (LES)

- Preventive approach
- Purpose
 - Effectively to establish and drive policies for livestock management and use
- Parameters of survey for local government unit
 - Livestock status : livestock number, excreta discharge and etc.
 - Nutrient status : consumption of inorganic and organic fertilizers, imported/exported manure, harvested crops and forages, nutrients in the soil and etc.
 - Environmental status : nutrients, heavy metal, odor and etc.
- Livestock Excreta Survey is expected to play an important role to implement site-specific livestock management and to be a basis of Nutrient Management Plan



CONCLUSIONS



Conclusions

- Intensive livestock industries have been grown up in Korea due to increase of market demands of livestock products
- Intensive livestock farming has various potential negative impacts on the environment
- In particular, pig excreta and manure have been highlighted as the center of environmental issues in Korea
- ME fully has recognized how important is pig excreta management for water quality and has prosecuted various environmental policies



THANK YOU



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