MANURE MANAGEMENT OF PIG FARM IN GIA KIEM COMMUNE, THONG NHAT DISTRICT, DONG NAI PROVINCE

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BACKGROUND

- Pig production in Vietnam - to farm scale - to meet the growing needs
- Cause serious environmental pollution
- Good management of manure has a significant meaning for sustainable developing
- Pig manure management not only for use as nutrient sources (NPKC), but also reduce emissions of greenhouse gases (GHG), ammonia, odors, pathogens, etc
- Survey manure management of pig farms in Gia Kiem commune, Thong Nhat district, Dong Nai province

MATERIALS AND METHODS

- ***General survey***

- Vietnam: population 90 mil, urban population 33.93 %, labor in agriculture 60.37 %
- Pig population: Vietnam 26,5 mil, South East area 2,78 mil, Dong Nai province 1,3 mil, Thong Nhat district 0,21 mil
- Thong Nhat district: area 24,724 ha, population 157,980, temperature 25 - 26^{o}C, rainfall 2,139 mm, 659 livestock farms. Sept 2013: 210,000 pigs , 950,000 chickens, 5271 ducks, 1.4 mil quail, 2,615 cattle and 2,390 goats
- Major part of the livestock production is sows and pigs in both farm and household scale

MATERIALS AND METHODS

- ***In-depth survey:***

- Conducted on 30 pig industrial farms/households in Gia Kiem commune, Thong Nhat district, Dong Nai province
- Randomly selected from a list of 265 households /farms of two hamlets Vo Dong 1 and Vo Dong 3
- Questionnaires: information about the farm's resources , the structure of livestock and livestock productivity, characteristics of pig production systems, the current status of manure management, constraints and limitations in management and use of pig manure

- ***Data processing:***

- Minitab version 14

RESULTS AND DISCUSSION: Farm resources

Criteria	n	Average	Std dev
Number of members (people)	30	5.3	1.3
Male	30	2.6	1.3
Female	30	2.7	1.1
Number of persons <16 years old (people)	30	1.2	1
Number of labors (person)	30	2.7	1.3
Current labor hours (hours/person/day)	30	5.3	1.9
Number of labors elsewhere (person)	30	0.8	1.2
The total area of agricultural land (ha)	25	1.8	2.8
The total land area for horticulture (ha)	23	1.7	2.9
Distance from farm to town (km)	30	1.81	0.1

RESULTS AND DISCUSSION:
Herd structure at the time of the survey

Criteria	Average	Std Dev
Total pigs (heads/farm)	279.3	320.3
Number of pigs > 20kg (heads/farm)	172.3	183.4
Average pig weight (kg)	51.5	6.8
Number of sows (heads/farm)	33	40.2
Average sow live weight (kg)	156	8.6
Number of pigs < 20 kg (heads/farm)	74	111.3
Average piglet weight (kg)	9.5	1.5

All farms are specialize in raising pigs, average of 280 pigs, growing pigs 62 %, piglets (< 20 kg) 27 %, 12% of sows
No farm raising boars observed

RESULTS AND DISCUSSION: Pig production in 2012

Criteria	Average	Std Dev
Growing pigs output/farm/year (heads)	539.5	573.6
Slaughter weight (kg)	101.5	3.3
Slaughter age (months)	6.2	0.4
Number of weaned pigs/farm/year (heads)	617.6	766.5
Number of weaned piglets/sow/year (heads)	18.6	1.4
Weaning weight (kg)	7.2	1.5

Pigs/piglets are main products, 100 % farms keep sows, raises growing pigs
All farmers use mixed feed, buy or mix themselves
A growing pig (weight > 20 kg) consumed 2.4 kg/day, piglets 0.36 kg/day; sows 2.9 kg/day

RESULTS AND DISCUSSION

Pig housing

Criteria	n	Average	Std Dev
Pig farm area (m^2)	30	1750.8	2265.2
Sow area (m^2)	30	186.4	231.9
Pork area (m^2)	30	1564.4	2097.8
Barn area/growing pig (m^2)	30	9.6	11
Barn area/pig (m^2)	30	8.9	8.8

All farms have fence, concrete floor and roof, no bedding material

For specific sows, pigs and piglets

Growing pig area occupies 89 %

9 m^2/pig due to low price/some empty barn

100 % use groundwater for cleaning cages

SOME IMAGES OF PIG RAISING IN DONG NAI PROVINCE

RESULTS AND DISCUSSION: Manure collection system

- Fresh solid manure collected daily, put into bags, sell to middleman
- Flushing daily in dry season, few days/time in rainy season
- Flushing water, urine, scattered feed follow cement trench to biogas pits/reservoirs
- 100 % farm not collect, store urine or mixture of urine and flushing water separately
- 70 % farms store slurry, in which 67 % store in the biogas system, 33 % store in pits nearby
- Average volume of biogas systems 9.7m^3/farm, of pit 28.1m^3/farm
- Each farm uses 6,975 liters of water/day, or 35 liters/growing pig and sow/day
- 2 main types of manure:

  (i) solid manure (feces)

  (ii) mixture of urine, flushing water and solid manure (slurry)


PREPARING TO COLLECT PIG MANURE


SIMPLE EQUIPMENT FOR MANURE COLLECTING

TEMPORARY STORE OF FRESH MANURE BEFORE SELLING

RESULTS AND DISCUSSION

Manure collection system

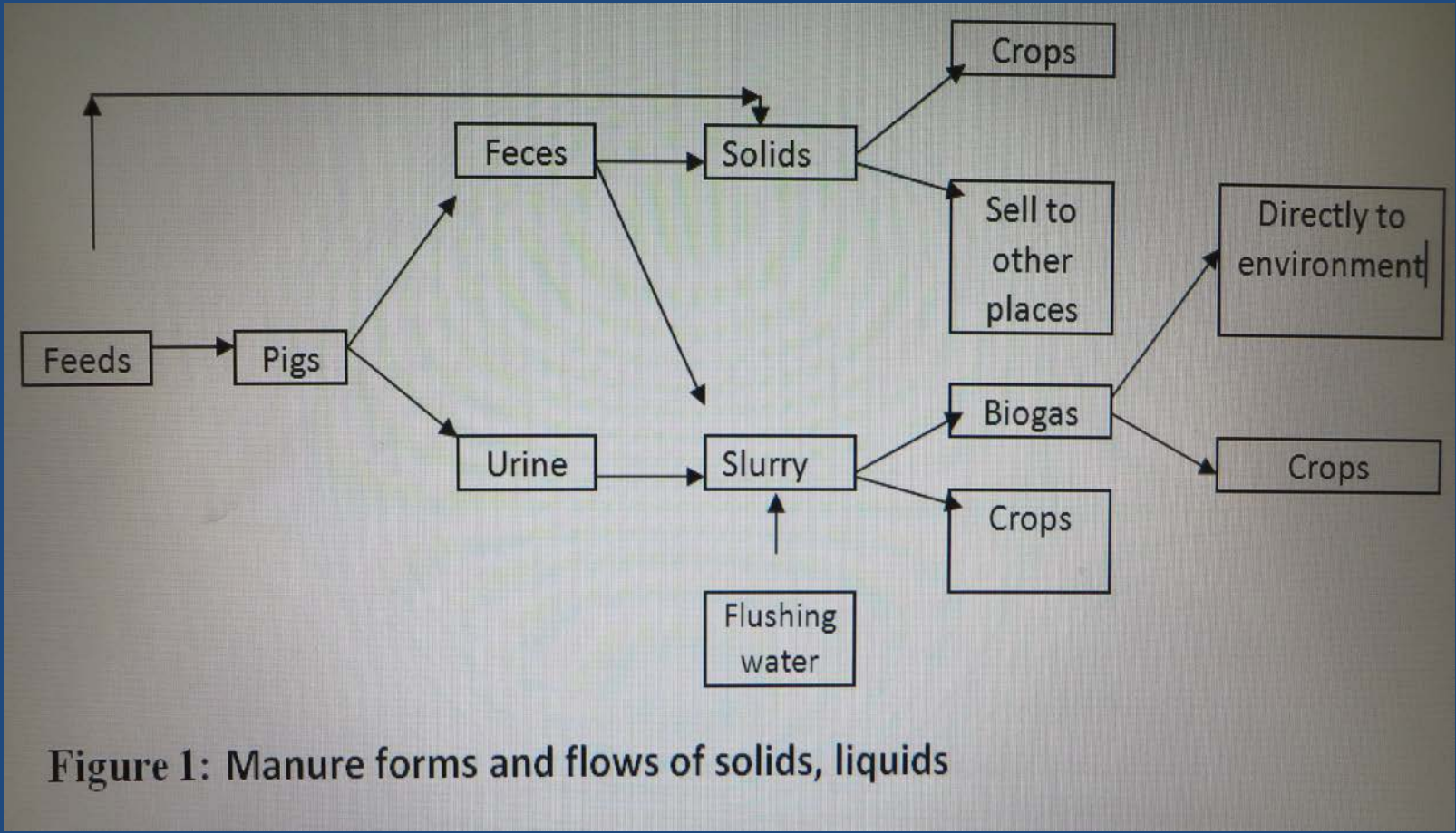

Figure 1: Manure forms and flows of solids, liquids


ONE TYPE OF BIOGAS SYSTEM IN PIG FARM

CEMENT TRENCH FOR SLURRY FLOW


A TYPE OF MANURE RESERVOIR IN PIG FARM


USING BIOGAS FOR COOKING IN HOUSEHOLD

RESULTS AND DISCUSSION

Manure collection system

- 13/15 farms store slurry, use all to ferment for anaerobic gas
- 02 farms use slurry for crops directly
- 9/13 farms use anaerobic fermentation products as fertilizer for crops
- 4 farms no use, discharge to environment
- Each farm collect 609 kg solid manure/day
- 17 % solid manure use directly for crop, 83 % sold

RESULTS AND DISCUSSION: Technical constraints

Criteria	Ratings (%)				
	Crucial	Very important	Important	Not so important	Irrelevant
Lack of collection capacity			16,67	63,33	20,00
Lack of storage capacity		6,67	16,67	53,33	23,33
Lack of treatment capacity	**26,67**	**46,67**	**20,00**	6,67	
Lack of transport capacity	**13,33**	**40,00**	**43,33**	3,33	
Lack of suitable equipment to apply manures		13,33	10,00	60,00	16,67

-2 constraints discouraging using manure as fertilizer is (i) lack of treatment capacity (93 %) and (ii) lack of transport capacity (96.7 %)
-Collection and storage capacity, lack of equipment are not main constraints

BROKEN BIOGAS SYSTEM IN PIG FARMS

DEGRADED BIOGAS SYSTEM IN PIG FARM

RESULTS AND DISCUSSION: Socio-economic constraints

Criteria	Ratings (%)				
	Crucial	Very important	Important	Not so important	Irrelevant
Too high transport costs, relative to those needed for mineral fertilizers		3,33	23,33	63,33	10,00
Too high labor costs, relative to that needed for the handling of mineral fertilizers		6,67	16,67	66,67	10,00
Too high prices of land, providing room for land spreading		16,67	20,00	53,33	10,00
Too low benefits when used as fertilizer, relative to benefits when used as a nutrient for aquaculture			6,67	16,67	76,67
Too low benefits when used as fertilizer, relative to benefits when used as a fuel			13,33	13,33	73,33

POLLUTION IN PIG FARM BECAUSE OF OVERLOAD


A PIT IS FULL OF MANURE


WATER POLLUTION IN PIG FARM

RESULTS AND DISCUSSION: Institutional constraints

Criteria	Ratings (%)				
	Crucial	Very important	Important	Not so important	Irrelevant
Absence of information regarding manure management improvements		23,33	23,33	46,67	6,67
Lack of access to the available information due to illiteracy		20,00	20,00	53,33	6,67
Absence of interest in manure management	**3,33**	**63,33**	**23,33**		10,00
Lack of access to loans for the required investments in storage, treatment and transport	**10,00**	**60,00**	**3,33**	20,00	6,67
Lack of access to required equipment and machines for storage, treatment and transport	10,00	13,33	3,33	66,67	6,67
Lack of trading infrastructure			16,67	76,67	6,67
Lack of regulations creating a level playing field for all farmers			26,67	60,00	13,33
Spatial separation of livestock farms and arable farms due to specialization		**16,67**	**56,67**	16,67	10,00

=>Need provide information, enhance farmer's awareness on manure management, invest manure treatment systems, no link between animal and cropping system (73%)

RESULTS AND DISCUSSION

Major reasons to improve manure management

Criteria	Ratings (%)				
	Crucial	Very important	Important	Not so important	Irrelevant
On-farm hygiene, considering human health	**60,00**	**40,00**			
On-farm hygiene, considering animal health	**30,00**	**63,33**	**6,67**		
Water quality, from the point of view of human and animal health	**56,67**	**43,33**			
Water quality, from the point of view of fishery quality	10,00	6,67		3,33	80,00
Abatement of odour problems, also for neighbours	**43,33**	**53,33**	**3,33**		
Missed fertilizer value for the crops grown by the farm itself		33,33	36,67	23,33	6,67
Missed income when sold as a fertilizer for other farms			23,33	76,67	

CONCLUSIONS AND RECOMMENDATIONS

- Surveyed farms specialize in intensive pig farming with herd size 279 heads/farm
- In 2012 every farm sold 540 growing pigs at 6 months of age, weight of 100 kg/head; all farms use mixed feeds, housing and industrial process
- 2 different types of manure: (i) solid manure (feces), (ii) mixture of feces, urine and flushing water (slurry). Farm uses 35 liters/growing pigs and sows/day
- 70 % farm storage slurry; in which 67 % using anaerobic fermentation slurry; product after that used for crops or discharge to environment, 33 % farms storage slurry in ponds
- Solid manure collected daily 609 kg/day/farm, 87 % transported by middleman for selling elsewhere

CONCLUSIONS AND RECOMMENDATIONS

- Lack of treatment capacity, lack of transport capacity, absence of information regarding manure management improvements, absence of interest in manure management, and lack of access to loans for building manure management system are the important factors discouraging the using manure as fertilizer
- Socio-economic constraints do not really hinder the decision to use manure as fertilizer on the farms
- Major reasons to improve manure management because of direct impact on human and animal heath, water quality and odor emissions to residential areas

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THANK FOR YOUR ATTENTION