SITUATION OF GREENHOUSE GAS EMISSIONS IN LIVESTOCK PRODUCTION

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General information



330,972 km² 30% for arable land Climate: monsoon tropic Temperature: 12.8 - 27.7°C Humidity: 84% **Population: 90 million** 70 percent of population living in rural areas and around 50 percent of labor force working in agriculture

Table 1: Agriculture and livestock GDP (billion USD) from 2012-201

Criteria	2013	2014	2015	2016	
Total GDP	146.9	162.2	178.2	187.2	
Agriculture GDP*	26.6	27.2	28.2	28.5	
Livestock GDP	6.55	6.70	7.09	7.30	
Percentage of livestock GDP in agriculture	24.6	24.7	25.2	25.7	
Percentage of livestock GDP in total	4.46	4.13	3.98	3.90	
* including crop and livestock production and related services					

Source: Vietnamese General Statistics Office

Livestock production systems

- Two systems: "intensive production" with large scale production and small household production

- Small-scale householders account for: 85% of the cattle, 80% of the poultry and 75% of pig population.

- Many householders tended to invest in intensive production for poultry, pigs than for cattle production.

- Buffalo and cattle management is mainly based on a low input/low output system that is often labor intensive, except in dairy cattle production.

Pig production



Chicken production









Cattle production





Duck production

Table 3: Various waste treatments applied by livestock farms (%)

	Solid waste	Liquid waste
Biogas	21	25
Fresh manure storage	26	0
Composting	10	0
Discharge to fish ponds	8	12
Discharge to land/stream	19	60
Selling fresh manure	7	0
Give away	2	0
Others	7	3
Total	100%	100%

5000000, 1100000, (2007)

Manure management

- Solid manure was used as organic fertilizer for crop production, nutrition for aquaculture or anaerobic fermentation.

- About 20% of solid manure was discharged into land or stream

- Chicken and cattle manure are considered as high-value organic fertilizer for coffee, pepper, fruit plants or grassland, while pig manure's market has just developed for recent years.

- Plants, through government supports, was conducted to convert liquid slurry to gas for cooking or electricity.

- More than haft of liquid waste was directly into the environment without applied any treatments. Liquid wastes in pig production is very huge due to high numbers of animals, and a high water volume for cooling, washing and flushing (about 100 water liters per day for each 50-kg pig).





Manure collection





Slurry kept in lagoon

* Air-dried manure





Composting manure with microorganism => bioorganic manure







Manure was sold as fertilizer to crop land





Manure application on the field

Biogas plants





Wastewater was discharged directly into the environment





Table 4: Evolution of GHG emissions in Vietnam

	1994		1998		2000	
	Emission in	%	Emission in	%	Emission in	%
	CO ₂ eq (Tg)		CO ₂ eq (Tg)		CO ₂ eq (Tg)	
Energy	25.6	24.7	43.5	35.9	52.8	35
Industrial	3.80	3.7	5.60	4.6	10.0	6.6
processes						
LULUCF	19.4	18.7	12.1	10	15.1	10
Agriculture	52.5	50.5	57.4	47.4	65.1	43.1
Waste	2.60	2.4	2.60	2.1	7.90	5.3
Total	103.9	100	121.2	100	150.9	100

Source: UNVN, 2011. Climate Change Factsheets (note: 1Tg = 1000 Gg)

Agriculture GHG emissions inventory in 2000

Sub-Sectors	2000		
	Emission in	%	
	CO ₂ eq (Tg)		
Rice cultivation	37.4	57.5	
Livestock*	11.2	17.2	
Agricultural soil	14.2	21.8	
Burning savanna	0.60	0.9	
Burning agriculture residue	1.70	2.6	
Total	65.1	100	

* Including enteric fermentation and manure management Source: UNVN, 2011. Climate Change Factsheets

Manure and Methane Release from main livestock

Animals	Million heads	Enteric CH4 production t.yr ⁻¹)	Total manure (Mt.yr ⁻¹)	Manure CH4 production t.yr ⁻ ¹)	Nitrogen excretion (t.yr ⁻¹)	Total N₂O (Gg.yr⁻¹)
Cattle	5.36	236,152	19.6	10,734	212,472	4.25
Buffalo	2.52	138,804	13.8	7,571	112,012	2.24
Pig	27.7	27,751	25.3	194,257	141,808	1.42
Poultry	341	0	25.0	7,863	92,098	0.92
Goat, sheep	1.89	9,450	1.03	416	7,657	0.08
Total		412,157	84.7 (> 25 Mt DM)	220,841	212,472	8.91

Source: *Data Estimation based on IPCC (1996)



Figure 2. Break down of emissions by animal type, averaged over 10 years

Project of GHG mitigation of Livestock section by 2020 (Mard, 2011)

Objective: reducing 6.30Mt CO_2e of (equivalent to 25.8% of estimated GHG emissions by 2020)

- 1. Changing diet: \downarrow 0.91 Mt CO₂e (~ 3.7%).
- 2. MBU supplementation (Molasses Urea Block) to dairy cow : \downarrow 0.37 MtCO₂e (~1.5%).

3. Animal waste management and renewable engergy production by BIOGAS: \downarrow 1.46 MtCO₂e (~ 5.9%).

Project of GHG mitigation of Livestock section by 2020 (Mard, 2011)

4. Anaerobic fermentation of aminal waste: \downarrow 3.56 Mt CO₂e (~14.6%).

Other methods:

- VietGAP application
- Converting roughage to concentrate, quality improvement of silage.
- Enhancing animal immunity
- Using probiotic
- Improving collection, storage/ treatment system of animal waste

Climate smart agricultural waste management practices

Program "Biogas Program for the Animal Husbandry Sector of Vietnam" from 2003–2005, extended to 2015

Objective: to further develop the commercial and structural deployment of biogas, and reduce the use of fossil fuels and biomass resource depletion.

145,000 biogas digesters constructed so far, leading emission reduction of 480,000 tons of CO_2 of per year, which means that every household has helped reduce 5 tons of CO_2 per year

Biogas Program has been issued an impressive amount of 779,924 GS-VER Gold Standard Voluntary Emissions Reduction credits (GS-VER), equivalent of 484,059 tCO₂ avoided carbon emissions in 2012 and 295,865 tCO₂eq in the first 6 months of 2013

* Climate smart agricultural waste management practices

The second project "Quality and Safety Enhancement of Agriculture Products and Biogas Development Project" has been implementing during 2009-2015.

One of the main benefits included use of bio-slurry as an organic fertilizer and reduction of water, air, and soil pollution as a result of biogas digester installation and operations

The project facilitates construction of 40,000 household biogas digesters in 16 provinces.

It is estimated that the proposed biogas development reduced carbon dioxide emissions by an equivalent of 40,000–60,000 tons per annum.

* Climate smart agricultural waste management practices

Program "Low carbon Agriculture Support Project" have been carried out from 2013-2019.

The project has supported the development of biogas plants

Construction of about 36,000 small biogas plants, 40 medium biogas plants and 10 large biogas plants; contribute to the government's efforts to access existing and future markets for carbon credits.

It has been estimated that the emission reduction for 36,000 small biogas plants will be about 900,000 ton CO_2 eq during six years of the project duration (at about 2.7 ton CO_2 eq/m³ biogas plant per year) (ADB, 2012).

Mitigation potential of 25 MtCO₂eq during a 20 year-period.

Thank you for your attention!