Assessment of ammonia abatement cost in dairy farming of the North-West of the Russian Federation:case study

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Initial data for assessment of cost estimates used in Gains:

- required emission abatement levels for various ammonia emission sources, as stated in the latest version of the Draft Revised Technical Annex IX to the Gothenburg Protocol;

- calculation data of ammonia abatement cost for the Russian Federation as cited in the "Background information for the Expert Workshop on the Costs of Ammonia Mitigation and the Climate co-benefits";

- EMEP/EEA Emission Inventory Guidebook 2009, updated June 2010, 4b Appendix an example of emissions estimation for a 100 head farm.

- statistical data on dairy production in Leningrad oblast in 2009; average annual per cow milk yield - 6993 kg, the self cost of 1 kg of produced milk -0,28 €;

- the expert estimation of the contract price of farms construction, including manure handling systems, on the North-West of the Russian Federation;

In the process of assessment all the estimated indicators were conversed to specific values per one animal and also per 1 kg of produced milk.

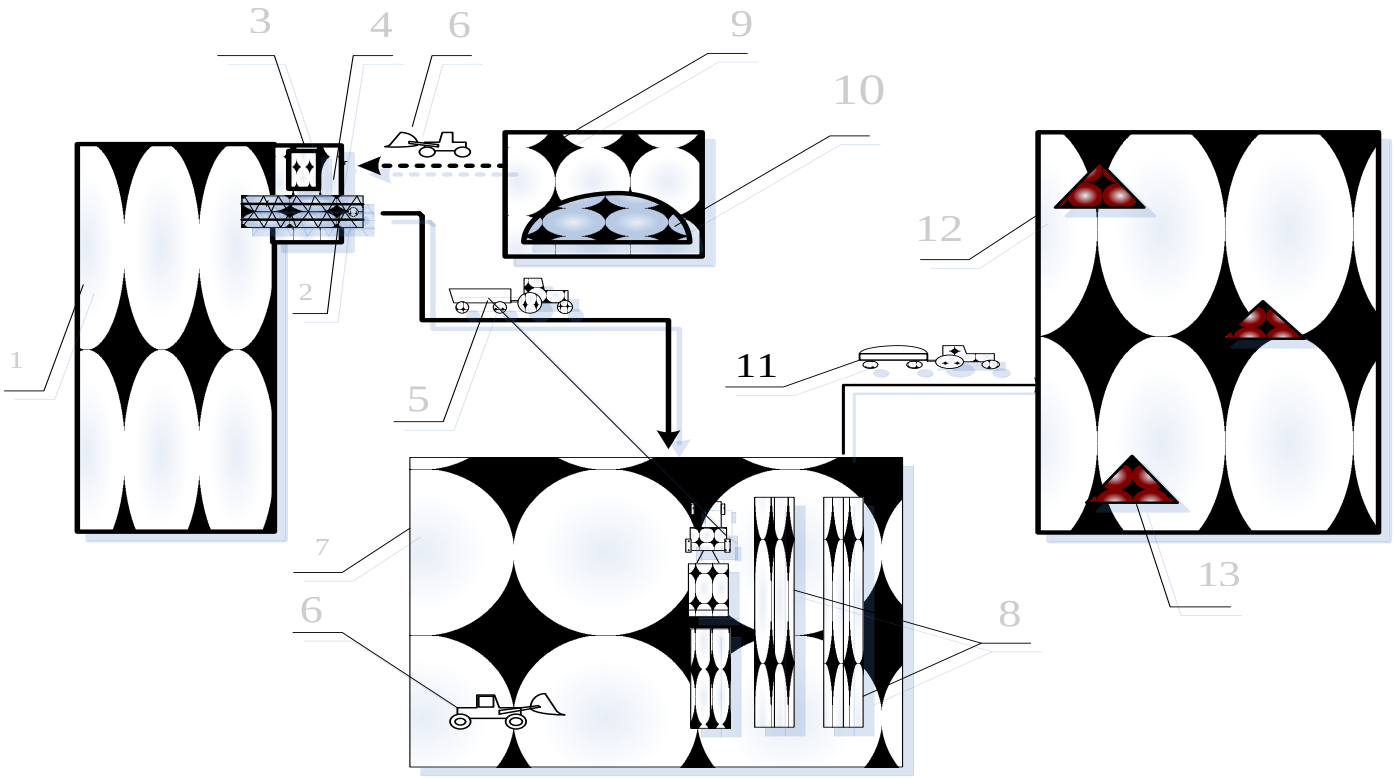
Assessment of ammonia abatement cost for a dairy farm under conditions of Leningrad Oblast

	Emissions			Cost		Assessment
	Ammonia emission reduction requirements DRAFT REVISED TECHNICAL ANNEX IX, %	Reference NH_3-N emissions EMEP/EEA emission inventory guidebook 2009 kg $a^{-1}AAP^{-1}$	Ammonia emission reductions kg $a^{-1}AAP^{-1}$	Cost of abated NH3-N Current cost estimates used in GAINS per unit of NH3 reduction Euro/kg NH3 as N abated)	Cost of abated NH3-N Euro/animal	Self cost increase of 1 kg of milk under conditions of Leningrad oblast, %
LNF	10	28,6	2,86	14,7	42,06	2,19
SA	25	9,23	52,3075	56,4	130,14	6,94
CS_Low	60	4,415	2,649	15,5	41,0595	2,08
CS high	80	4,415	3,532	28,5	100,662	5,05
LNA_low	30	9,965	2,9895	29,0	86,6955	1
LNA_high	60	9,965	5,979	14,5	86,6955	1

The estimated cost of ammonia abatement used in GAINS compared with the expert estimations for Leningrad Oblast

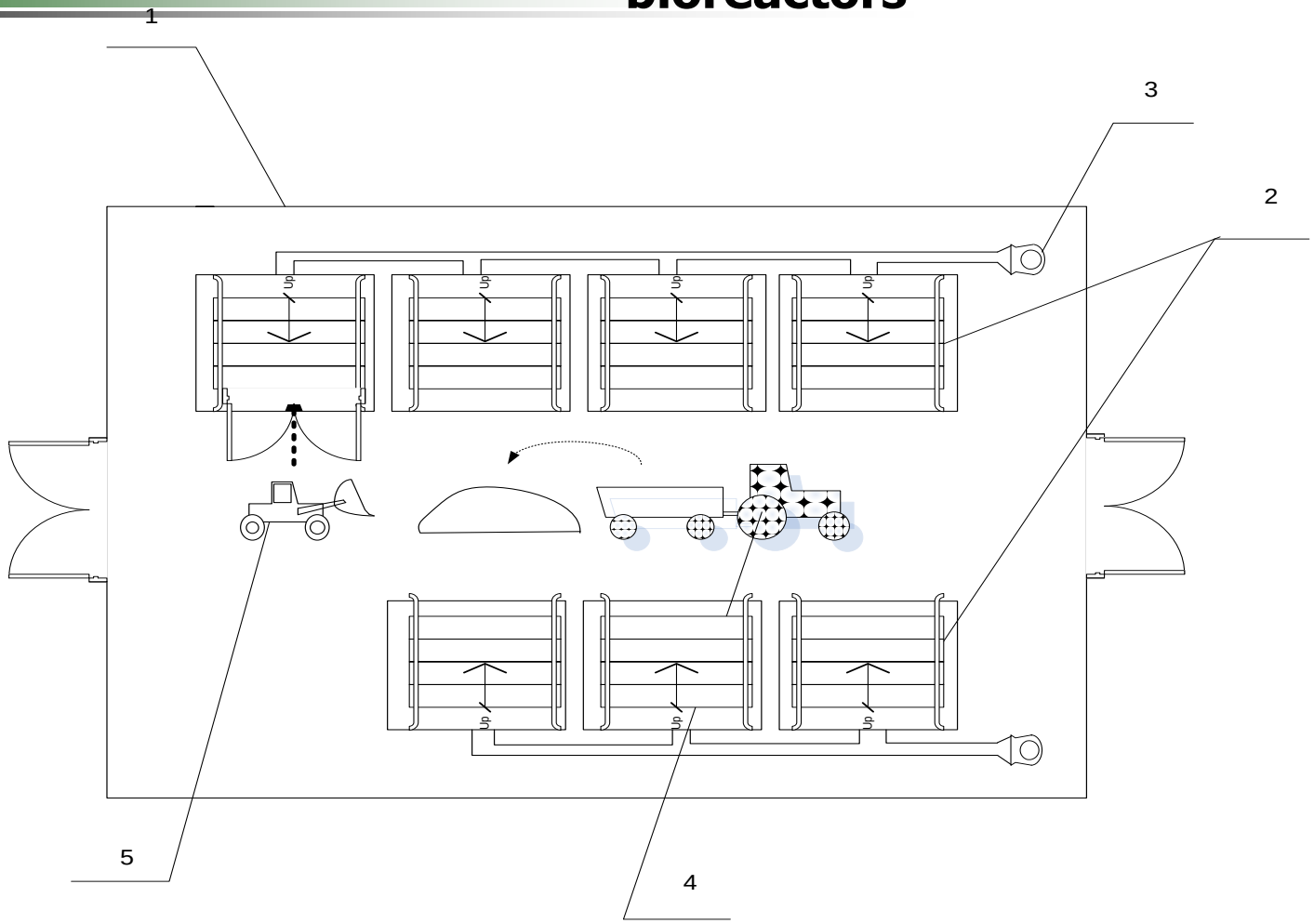
	Estimated object	Expert estimation for Leningrad Oblast	Estimated indicators used in GAINS
LNF feeding		Self cost of 1kg of produced milk is 0,24€	Cost of emission abatement through feeding strategies are 0,00615€ /kg of milk
SA housing	Dairy barn	Capital inputs per 1 animal are 4536€	Cost of ammonia abatement through the building improvement per one head are 130€
CS storage	Manure storage for 5000m^3 on a farm for 400 head	Manure storage cost is from 55000€ to 150 000€ The cover cost is from 50 000€ to 100 000€	Cost of ammonia abatement through a storage cover are 40 242€
LNA land application	Farm for 800 head	The overall investments in the system of manure land application is from 390 000 to 510 000€	Cost of ammonia abatement measures in land application is 67 280€

Technology of composting the mix of manure with some moisture-absorbing materials on the farm batch-grounds



1 – barn; 2 – auger conveyor; 3 – moisture-absorbing material meter; 4 – mixing station; 5 – tractor with trailer for piling (РОУ-6 or ПРТ-10) ; 6 – front-side forklift; 7 – composting ground; 8 – compost piles; 9 – moisture-absorbing material storing site; 10 – moisture-absorbing material (chopped straw, peat, saw dust); 11 – vehicle for ready compost transportation; 12 – field; 13 – field-side piles of ready compost

Technology of composting the mix of manure with some moisture-absorbing materials in stationary chamber-type bioreactors



1 – facility for making composts; 2 – fermentation chambers;
3 – ventilator; 4 – tractor with trailer; 5 – front-side forklift

Technical and economic indices of manure composting technology (86% moisture content) using a moisture-absorbing material on a farm batch-ground

Livestock and type of moisture-absorbing material									
Indicator	unit	200			400			600	
		straw	peat	poultry manure	straw	peat	poultry manure	straw	peat	poultry manure
Moisture-absorbing material	t/year	950	6030	6030	1900	12060		2850	18090	
Capital input	thousand €	93,75	165,75	165,75	170	301,5		2356	460	
Operation cost	thousand €	45	142,5	76,5	66	252,9	114,475	84	379,2	6861
Unit cost	€/t	8,55	13,775	7,4	6,275	12,225	5,55	5,325	12,225	5,525
Unit cost with account for transportation and application cost	€/t	12,45	17,325	10,95	9,85	14,5	7,825	8,625	14,875	8,025

Conclusions

- Assessment of ammonia emission abatement measures is an issue of present interest as cost estimates are needed for decision making on various levels

- Exponent of estimates according to GAINS data is comparable with existing national price level. For more detailed analysis more information on the values of capital and operation costs adopted in GAINS calculations is required

- Assessment procedure of emission abatement costs needs to be developed for calculations on a farm, region or country level. This procedure should include standard per-unit indicators of inputs for various technological processes per one head, per 1 kg of milk, per hectare, etc

- Development of procedure of economic cost estimation for the conditions of Russia should be a part of integrated research on environmental pollution abatement from agricultural sources including updating of emission factors from all sources, initial data collecting on manure handling technologies on various farms, etc.

- When estimating the value of joining the GP by Russia additional evaluation is needed of costs of organizational activities to amend legislation and to monitor implementation of ammonia abatement measures on the farm and region levels.

Thank you !