FARM DATA NEEDED FOR AGRI-ENVIRONMENTAL REPORTING

Technical document summarizing the findings of the DireDate project for the Final Seminar in Luxembourg on 28 March 2011¹

Annex 4. Specific recommendations for collection farm data related to gross nitrogen and phosphorus balances and ammonia and greenhouse gas emissions.

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Annex 4. Specific recommendations for collection farm data related to gross nitrogen and phosphorus balances and ammonia and greenhouse gas emissions.

This annex presents 6 tables with specific recommendations for collecting the farm data required to calculate gross nitrogen (N) and phosphorus (P) balances and ammonia (NH₃) and greenhouse gas (GHG) emissions, as discussed in Chapters 4, 6 and 7. The 6 tables (Tables A4.1 to A4.6) include specifications for:

- 1. data related to inputs of N and P.
- 2. coefficients related to inputs of N and P.
- 3. data related to factors affecting emissions of ammonia and greenhouse gases.
- 4. coefficients related to factors affecting emissions of ammonia and greenhouse gases.
- 5. data related to N and P in harvested crop products.
- 6. coefficients related to N and P in harvested crop products

Table. A4.1. Recommendations for collection of <u>data related to inputs of N and P</u>.

Two scenarios are included. The minimum scenario is the scenario with collection of data which are at least needed for reporting for policies and AEI (e.g. Tier 1) and the optimum scenario is the scenario for collection of data in detailed approaches (e.g. Tier 2 and 3 methods).

Type of data	Scenario	Data	Unit	Policy need	AEI need	Scale of	collection	I Livestock registers, FSS Livestock registers, Livestock registers, Livestock registers,	
data		specification Number/amount		need		Spatial	Temporal	_	
Number of livestock	Minimum	dairy cattle	average number of live animals per farm	UNFCCC, WFD, ND, NECD	10.2, 12, 13, 15, 16, 18, 19	Farm	Annual	0 -	
Number of livestock	Minimum	beef cattle	average number of live animals per farm	UNFCCC, WFD, ND, NECD	10.2, 12, 13, 15, 16, 18, 19	Farm	Annual		
Number of livestock	Minimum	other cattle	average number of live animals	UNFCCC, WFD, ND, NECD	10.2, 12, 13, 15, 16, 18, 19	Farm	Annual	_	
Number of livestock	Minimum	sows, incl.piglets	per farm average number of live animals per farm	UNFCCC, WFD, ND, NECD	10.2, 12, 13, 15, 16, 18, 19	Farm	Annual	~	
Number of livestock	Minimum	fattening pigs	average number of live animals per farm	UNFCCC, WFD, ND, NECD	10.2, 12, 13, 15, 16, 18, 19	Farm	Annual	Livestock registers, FSS	
Number of livestock	Minimum	broilers	average number of live animals per farm	UNFCCC, WFD, ND, NECD	10.2, 12, 13, 15, 16, 18, 19	Farm	Annual	Livestock registers, FSS	

Number of livestock	Minimum	laying hens	average number of live animals	UNFCCC, WFD, ND, NECD	10.2, 12, 13, 15, 16, 18, 19	Farm	Annual	Livestock registers, FSS
Number of livestock	Minimum	other poultry	per farm average number of live animals	UNFCCC, WFD, ND, NECD	10.2, 12, 13, 15, 16, 18, 19	Farm	Annual	Livestock registers, FSS
Number of livestock	Minimum	other	per farm average number of live animals	UNFCCC, WFD, ND, NECD	10.2, 12, 13, 15, 16, 18, 19	Farm	Annual	Livestock registers, FSS
Number of livestock	Optimum	dairy cattle	per farm average number of live animals	UNFCCC, WFD, ND, NECD	10.2, 12, 13, 15, 16, 18, 19	Farm	Annual	Livestock registers, FSS
Number of livestock	Optimum	beef cattle	per farm average number of live animals	UNFCCC, WFD, ND, NECD	10.2, 12, 13, 15, 16, 18, 19	Farm	Annual	Livestock registers, FSS
Number of livestock	Optimum	young cattle	per farm average number of live animals	UNFCCC, WFD, ND, NECD	10.2, 12, 13, 15, 16, 18, 19	Farm	Annual	Livestock registers, FSS
Number of livestock	Optimum	calves	per farm average number of live animals	UNFCCC, WFD, ND, NECD	10.2, 12, 13, 15, 16, 18, 19	Farm	Annual	Livestock registers, FSS
Number of livestock	Optimum	sows, incl.piglets	per farm average number of live animals per farm	UNFCCC, WFD, ND, NECD	10.2, 12, 13, 15, 16, 18, 19	Farm	Annual	Livestock registers, FSS

Number of livestock	Optimum	fattening pigs	average number of live animals	UNFCCC, WFD, ND, NECD	10.2, 12, 13, 15, 16, 18, 19	Farm	Annual	Livestock registers, FSS
Number of livestock	Optimum	boars	per farm average number of live animals	UNFCCC, WFD, ND, NECD	10.2, 12, 13, 15, 16, 18, 19	Farm	Annual	Livestock registers, FSS
Number of livestock	Optimum	other pigs	per farm average number of live animals	UNFCCC, WFD, ND, NECD	10.2, 12, 13, 15, 16, 18, 19	Farm	Annual	Livestock registers, FSS
Number of livestock	Optimum	broilers	per farm average number of live animals	UNFCCC, WFD, ND, NECD	10.2, 12, 13, 15, 16, 18, 19	Farm	Annual	Livestock registers, FSS
Number of livestock	Optimum	laying hens	per farm average number of live animals	UNFCCC, WFD, ND, NECD	10.2, 12, 13, 15, 16, 18, 19	Farm	Annual	Livestock registers, FSS
Number of livestock	Optimum	turkey	per farm average number of live animals	UNFCCC, WFD, ND, NECD	10.2, 12, 13, 15, 16, 18, 19	Farm	Annual	Livestock registers, FSS
Number of livestock	Optimum	ducks	per farm average number of live animals	UNFCCC, WFD, ND, NECD	10.2, 12, 13, 15, 16, 18, 19	Farm	Annual	Livestock registers, FSS
Number of livestock	Optimum	other poutrly	per farm average number of live animals per farm	UNFCCC, WFD, ND, NECD	10.2, 12, 13, 15, 16, 18, 19	Farm	Annual	Livestock registers, FSS

Number of	Optimum	sheep	average	UNFCCC,	10.2, 12, 13,	Farm	Annual	Livestock registers,
livestock			number of	WFD, ND,	15, 16, 18, 19			FSS
			live animals	NECD				
			per farm					
Number of	Optimum	goat	average	UNFCCC,	10.2, 12, 13,	Farm	Annual	Livestock registers,
livestock			number of	WFD, ND,	15, 16, 18, 19			FSS
			live animals	NECD				
			per farm					
Number of	Optimum	horses	average	UNFCCC,	10.2, 12, 13,	Farm	Annual	Livestock registers,
livestock	_		number of	WFD, ND,	15, 16, 18, 19			FSS
			live animals	NECD				
			per farm					
Grazing	Minimum	dairy cattle	% of time	UNFCCC,	11.3, 10.2, 12,	Farm	1x 3 yrs	SAPM
system			spent	WFD, ND,	13, 15, 16, 18,			
ĺ			outside	NECD	19			
Grazing	Minimum	other cattle	% of time	UNFCCC,	11.3, 10.2, 12,	Farm	1x 3 yrs	SAPM
system			spent	WFD, ND,	13, 15, 16, 18,			
			outside	NECD	19			
Grazing	Minimum	other grazing	% of time	UNFCCC,	11.3, 10.2, 12,	Farm	1x 3 yrs	SAPM
system		livestock	spent	WFD, ND,	13, 15, 16, 18,			
			outside	NECD	19			
Grazing	Optimum	dairy cattle	% of time	UNFCCC,	11.3, 10.2, 12,	Farm	1x 3 yrs	SAPM
system	1		spent	WFD, ND,	13, 15, 16, 18,			
			outside	NECD	19			
Grazing	Optimum	beef cattle	% of time	UNFCCC,	11.3, 10.2, 12,	Farm	1x 3 yrs	SAPM
system	- r		spent	WFD, ND,	13, 15, 16, 18,			
			outside	NECD	19			
Grazing	Optimum	young cattle	% of time	UNFCCC,	11.3, 10.2, 12,	Farm	1x 3 yrs	SAPM
system	- r	7 8	spent	WFD, ND,	13, 15, 16, 18,			
			outside	NECD	19			
Grazing	Optimum	calves	% of time	UNFCCC,	11.3, 10.2, 12,	Farm	1x 3 yrs	SAPM
system	- L		spent	WFD, ND,	13, 15, 16, 18,			
2,000111			outside	NECD,	19			
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Grazing	Optimum	sheep	% of time	UNFCCC,	11.3, 10.2, 12,	Farm	1x 3 yrs	SAPM
system			spent	WFD, ND,	13, 15, 16, 18,			
			outside	NECD	19			
Grazing	Optimum	goat	% of time	UNFCCC,	11.3, 10.2, 12,	Farm	1x 3 yrs	SAPM
system			spent	WFD, ND,	13, 15, 16, 18,			
			outside	NECD	19			
Grazing	Optimum	horses	% of time	UNFCCC,	11.3, 10.2, 12,	Farm	1x 3 yrs	SAPM
system			spent	WFD, ND,	13, 15, 16, 18,			
			outside	NECD	19			
Grazing	Optimum	other grazing	% of time	UNFCCC,	11.3, 10.2, 12,	Farm	1x 3 yrs	SAPM
system		livestock	spent	WFD, ND,	13, 15, 16, 18,			
			outside	NECD	19			
N fertilizer	Minimum	ammonium nitrate	kg N per	UNFCCC,	12, 13, 15, 16,	National	Annual	Calculated on the
consumption			country per	WFD, ND,	18, 19			basis of approved
			year	NECD				Protocols
N fertilizer	Minimum	calcium	kg N per	UNFCCC,	12, 13, 15, 16,	National	Annual	Calculated on the
consumption		ammonium nitrate	country per	WFD, ND,	18, 19			basis of approved
			year	NECD				Protocols
N fertilizer	Minimum	anhydrous	kg N per	UNFCCC,	12, 13, 15, 16,	National	Annual	Calculated on the
consumption		ammonia	country per	WFD, ND,	18, 19			basis of approved
_			year	NECD				Protocols
N fertilizer	Minimum	ammonium	kg N per	UNFCCC,	12, 13, 15, 16,	National	Annual	Calculated on the
consumption	1,21111110411	phosphate	country per	WFD, ND,	18, 19	1 (101011111	111110101	basis of approved
С 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		Paragrames	year	NECD ,	,			Protocols
N fertilizer	Minimum	urea	kg N per	UNFCCC,	12, 13, 15, 16,	National	Annual	Calculated on the
consumption	IVIIIIIIIIIIIIIII	urea	country per	WFD, ND,	18, 19	Nauonai	Aimuai	basis of approved
Consumption				NECD	10, 17			Protocols
2.7.6.11			year					
N fertilizer	Minimum	urea-ammonium	kg N per	UNFCCC,	12, 13, 15, 16,	National	Annual	Calculated on the
consumption		nitrate solution	country per	WFD, ND,	18, 19			basis of approved
		(UAN)	year	NECD				Protocols

N fertilizer consumption	Minimum	other N fertilizers	kg N per country per year	UNFCCC, WFD, ND, NECD	12, 13, 15, 16, 18, 19	National	Annual	Calculated on the basis of approved Protocols
P fertilizer consumption	Minimum	P fertilizers (all types)	kg P per country per year	UNFCCC, WFD, ND, NECD	12, 13, 15, 16, 18, 19	National	Annual	Calculated on the basis of approved Protocols
N fertilizer consumption	Optimum	calcium ammonium nitrate	kg N per ha per year	UNFCCC, WFD, ND, NECD	12, 13, 15, 16, 18, 19	Farm	Annual	Farm survey
N fertilizer consumption	Optimum	anhydrous ammonia	kg N per ha per year	UNFCCC, WFD, ND, NECD	12, 13, 15, 16, 18, 19	Farm	Annual	Farm survey
N fertilizer consumption	Optimum	ammonium phosphate	kg N per ha per year	UNFCCC, WFD, ND, NECD	12, 13, 15, 16, 18, 19	Farm	Annual	Farm survey
N fertilizer consumption	Optimum	urea	kg N per ha per year	UNFCCC, WFD, ND, NECD	12, 13, 15, 16, 18, 19	Farm	Annual	Farm survey
N fertilizer consumption	Optimum	urea-ammonium nitrate solution (UAN)	kg N per ha per year	UNFCCC, WFD, ND, NECD	12, 13, 15, 16, 18, 19	Farm	Annual	Farm survey
N fertilizer consumption	Optimum	other N fertilizers	kg N per ha per year	UNFCCC, WFD, ND, NECD	12, 13, 15, 16, 18, 19	Farm	Annual	Farm survey
P fertilizer consumption	Optimum	P fertilizers (all types)	kg P per ha per year	UNFCCC, WFD, ND, NECD	12, 13, 15, 16, 18, 19	Farm	Annual	Farm survey
Biological N fixation	Minimum/ optimum	clover	ha	UNFCCC, WFD, ND	4, 12, 13, 15, 16, 18, 19	Regional	Annual	FSS / Farm survey
Biological N fixation	Minimum/ optimum	peas	ha	UNFCCC, WFD, ND	4, 12, 13, 15, 16, 18, 19	Regional	Annual	FSS / Farm survey
Biological N fixation	Minimum/ optimum	beans	ha	UNFCCC, WFD, ND	4, 12, 13, 15, 16, 18, 19	Regional	Annual	FSS / Farm survey

Biological N	Minimum/	soya bean	ha	UNFCCC,	4, 12, 13, 15,	Regional	Annual	FSS / Farm survey
fixation	optimum			WFD, ND	16, 18, 19			
Biological N	Minimum/	lucerne	ha	UNFCCC,	4, 12, 13, 15,	Regional	Annual	FSS / Farm survey
fixation	optimum			WFD, ND	16, 18, 19			
Biological N	Minimum/	lupins	ha	UNFCCC,	4, 12, 13, 15,	Regional	Annual	FSS / Farm survey
fixation	optimum			WFD, ND	16, 18, 19			
Atmospheric	Minimum/	dry deposition	kg N per ha	UNFCCC,	15, 18, 19	Regional	Annual	EMEP data base
N depostion	optimum		per year	WFD, ND,				
	_			NECD				
Atmospheric	Minimum/	wetdeposition	kg N per ha	UNFCCC,	15, 18, 19	Regional	Annual	EMEP data base
N depostion	optimum		per year	WFD, ND,				
				NECD				

Table A4.2. Recommendations for collection of coefficients related to inputs of N and P.

Two scenarios are included. The minimum scenario is the scenario with collection of data which are at least needed for reporting for policies and AEI (e.g. Tier 1) and the optimum scenario is the scenario for collection of data in detailed approaches (e.g. Tier 2 and 3 methods).

Type of coefficient	Scenario	Data specification	Unit / dimension	Policy need	AEI need	Scale of e	estimate	Source/method
Coefficient		specification	difficusion	need		Spatial	Temporal	
N excretion	Minimum	dairy cattle	kg/animal/yr	UNFCCC, WFD, ND,	10.2, 12, 13, 15, 16, 18, 19	Regional	1 x 3 yr	Calculated on the basis of approved
N excretion	Minimum	beef cattle	kg/animal/yr	NECD UNFCCC, WFD, ND,	10.2, 12, 13, 15, 16, 18, 19	National	1 x 3 yr	Protocols Calculated on the basis of approved
N excretion	Minimum	other cattle	kg/animal/yr	NECD UNFCCC, WFD, ND,	10.2, 12, 13, 15, 16, 18, 19	National	1 x 3 yr	Protocols Calculated on the basis of approved
N excretion	Minimum	sows, incl.piglets	kg/animal/yr	NECD UNFCCC, WFD, ND,	10.2, 12, 13, 15, 16, 18, 19	National	1 x 3 yr	Protocols Calculated on the basis of approved
N excretion	Minimum	fattening pigs	kg/animal/yr	NECD UNFCCC, WFD, ND,	10.2, 12, 13, 15, 16, 18, 19	National	1 x 3 yr	Protocols Calculated on the basis of approved
N excretion	Minimum	broilers	kg/animal/yr	NECD UNFCCC, WFD, ND, NECD	10.2, 12, 13, 15, 16, 18, 19	National	1 x 3 yr	Protocols Calculated on the basis of approved Protocols
N excretion	Minimum	laying hens	kg/animal/yr	UNFCCC, WFD, ND, NECD	10.2, 12, 13, 15, 16, 18, 19	National	1 x 3 yr	Calculated on the basis of approved Protocols
N excretion	Minimum	other poultry	kg/animal/yr	UNFCCC, WFD, ND, NECD	10.2, 12, 13, 15, 16, 18, 19	National	1 x 3 yr	Calculated on the basis of approved Protocols

N .	Minimum	other	kg/animal/yr	UNFCCC,	10.2, 12, 13,	National	1 x 3 yr	Calculated on the
excretion				WFD, ND, NECD	15, 16, 18, 19			basis of approved Protocols
N	Optimum	dairy cattle	kg/animal/yr	UNFCCC,	10.2, 12, 13,	Regional	1 x 3 yr	Calculated on the
excretion	Punium	dairy cattie	Kg/ ammai/ yr	WFD, ND,	15, 16, 18, 19	regional	I A S yı	basis of approved
				NECD ,	12, 23, 23, 27			Protocols
N	Optimum	beef cattle	kg/animal/yr	UNFCCC,	10.2, 12, 13,	National	1 x 3 yr	Calculated on the
excretion	1		J ,	WFD, ND,	15, 16, 18, 19		ĺ	basis of approved
				NECD				Protocols
N	Optimum	young cattle	kg/animal/yr	UNFCCC,	10.2, 12, 13,	National	1 x 3 yr	Calculated on the
excretion				WFD, ND,	15, 16, 18, 19		,	basis of approved
				NECD				Protocols
N	Optimum	calves	kg/animal/yr	UNFCCC,	10.2, 12, 13,	National	1 x 3 yr	Calculated on the
excretion				WFD, ND,	15, 16, 18, 19			basis of approved
				NECD				Protocols
N	Optimum	sows,	kg/animal/yr	UNFCCC,	10.2, 12, 13,	National	1 x 3 yr	Calculated on the
excretion		incl. piglets		WFD, ND,	15, 16, 18, 19			basis of approved
				NECD				Protocols
N	Optimum	fattening pigs	kg/animal/yr	UNFCCC,	10.2, 12, 13,	National	1 x 3 yr	Calculated on the
excretion				WFD, ND,	15, 16, 18, 19			basis of approved
				NECD				Protocols
N	Optimum	boars	kg/animal/yr	UNFCCC,	10.2, 12, 13,	National	1 x 3 yr	Calculated on the
excretion				WFD, ND,	15, 16, 18, 19			basis of approved
				NECD				Protocols
N	Optimum	other pigs	kg/animal/yr	UNFCCC,	10.2, 12, 13,	National	1 x 3 yr	Calculated on the
excretion				WFD, ND,	15, 16, 18, 19			basis of approved
				NECD				Protocols
N	Optimum	broilers	kg/animal/yr	UNFCCC,	10.2, 12, 13,	National	1 x 3 yr	Calculated on the
excretion				WFD, ND,	15, 16, 18, 19			basis of approved
				NECD				Protocols
N	Optimum	laying hens	kg/animal/yr	UNFCCC,	10.2, 12, 13,	National	1 x 3 yr	Calculated on the
excretion				WFD, ND,	15, 16, 18, 19			basis of approved
				NECD				Protocols

N excretion	Optimum	turkey	kg/animal/yr	UNFCCC, WFD, ND,	10.2, 12, 13, 15, 16, 18, 19	National	1 x 3 yr	Calculated on the basis of approved
Cheredon				NECD	10, 10, 10, 17			Protocols
N	Optimum	ducks	kg/animal/yr	UNFCCC,	10.2, 12, 13,	National	1 x 3 yr	Calculated on the
excretion	1			WFD, ND,	15, 16, 18, 19		Í	basis of approved
				NECD				Protocols
N	Optimum	other poultry	kg/animal/yr	UNFCCC,	10.2, 12, 13,	National	1 x 3 yr	Calculated on the
excretion				WFD, ND,	15, 16, 18, 19			basis of approved
				NECD				Protocols
N	Optimum	sheep	kg/animal/yr	UNFCCC,	10.2, 12, 13,	National	1 x 3 yr	Calculated on the
excretion				WFD, ND,	15, 16, 18, 19			basis of approved
				NECD				Protocols
N	Optimum	goat	kg/animal/yr	UNFCCC,	10.2, 12, 13,	National	1 x 3 yr	Calculated on the
excretion				WFD, ND,	15, 16, 18, 19			basis of approved
				NECD				Protocols
N	Optimum	horses	kg/animal/yr	UNFCCC,	10.2, 12, 13,	National	1 x 3 yr	Calculated on the
excretion				WFD, ND,	15, 16, 18, 19			basis of approved
				NECD				Protocols
P excretion	Minimum	dairy cattle	kg/animal/yr	UNFCCC,	10.2, 12, 13,	Regional	1 x 3 yr	Calculated on the
				WFD, ND,	15, 16, 18, 19			basis of approved
				NECD				Protocols
P excretion	Minimum	beef cattle	kg/animal/yr	UNFCCC,	10.2, 12, 13,	National	1 x 3 yr	Calculated on the
				WFD, ND,	15, 16, 18, 19			basis of approved
				NECD				Protocols
P excretion	Minimum	other cattle	kg/animal/yr	UNFCCC,	10.2, 12, 13,	National	1 x 3 yr	Calculated on the
				WFD, ND,	15, 16, 18, 19			basis of approved
				NECD				Protocols
P excretion	Minimum	sows,	kg/animal/yr	UNFCCC,	10.2, 12, 13,	National	1 x 3 yr	Calculated on the
		incl.piglets		WFD, ND,	15, 16, 18, 19			basis of approved
				NECD				Protocols
P excretion	Minimum	fattening pigs	kg/animal/yr	UNFCCC,	10.2, 12, 13,	National	1 x 3 yr	Calculated on the
				WFD, ND,	15, 16, 18, 19			basis of approved
1			1	NECD				Protocols

P excretion	Minimum	broilers	kg/animal/yr	UNFCCC,	10.2, 12, 13,	National	1 x 3 yr	Calculated on the
				WFD, ND,	15, 16, 18, 19			basis of approved
				NECD				Protocols
P excretion	Minimum	laying hens	kg/animal/yr	UNFCCC,	10.2, 12, 13,	National	1 x 3 yr	Calculated on the
				WFD, ND,	15, 16, 18, 19			basis of approved
				NECD				Protocols
P excretion	Minimum	other poultry	kg/animal/yr	UNFCCC,	10.2, 12, 13,	National	1 x 3 yr	Calculated on the
				WFD, ND,	15, 16, 18, 19			basis of approved
				NECD				Protocols
P excretion	Minimum	other	kg/animal/yr	UNFCCC,	10.2, 12, 13,	National	1 x 3 yr	Calculated on the
				WFD, ND,	15, 16, 18, 19			basis of approved
				NECD				Protocols
P excretion	Optimum	dairy cattle	kg/animal/yr	UNFCCC,	10.2, 12, 13,	Regional	1 x 3 yr	Calculated on the
				WFD, ND,	15, 16, 18, 19			basis of approved
				NECD				Protocols
P excretion	Optimum	beef cattle	kg/animal/yr	UNFCCC,	10.2, 12, 13,	National	1 x 3 yr	Calculated on the
				WFD, ND,	15, 16, 18, 19			basis of approved
				NECD				Protocols
P excretion	Optimum	young cattle	kg/animal/yr	UNFCCC,	10.2, 12, 13,	National	1 x 3 yr	Calculated on the
	_			WFD, ND,	15, 16, 18, 19			basis of approved
				NECD				Protocols
P excretion	Optimum	calves	kg/animal/yr	UNFCCC,	10.2, 12, 13,	National	1 x 3 yr	Calculated on the
	_			WFD, ND,	15, 16, 18, 19			basis of approved
				NECD				Protocols
P excretion	Optimum	sows,	kg/animal/yr	UNFCCC,	10.2, 12, 13,	National	1 x 3 yr	Calculated on the
		incl.piglets		WFD, ND,	15, 16, 18, 19			basis of approved
				NECD				Protocols
P excretion	Optimum	fattening pigs	kg/animal/yr	UNFCCC,	10.2, 12, 13,	National	1 x 3 yr	Calculated on the
				WFD, ND,	15, 16, 18, 19		,	basis of approved
				NECD				Protocols
P excretion	Optimum	boars	kg/animal/yr	UNFCCC,	10.2, 12, 13,	National	1 x 3 yr	Calculated on the
				WFD, ND,	15, 16, 18, 19		-	basis of approved
				NECD				Protocols

P excretion	Optimum	other pigs	kg/animal/yr	UNFCCC,	10.2, 12, 13,	National	1 x 3 yr	Calculated on the
				WFD, ND,	15, 16, 18, 19			basis of approved
D		1 '1	1 / . 1/	NECD	4004040	NT .1 1	4 0	Protocols
P excretion	Optimum	broilers	kg/animal/yr	UNFCCC,	10.2, 12, 13,	National	1 x 3 yr	Calculated on the
				WFD, ND,	15, 16, 18, 19			basis of approved
D .:	O .:	1	1 / . 1/	NECD	10.0.10.12	NT .: 1	1 2	Protocols
P excretion	Optimum	laying hens	kg/animal/yr	UNFCCC,	10.2, 12, 13,	National	1 x 3 yr	Calculated on the
				WFD, ND,	15, 16, 18, 19			basis of approved
D	0 .:	. 1	1 / . 1/	NECD	10 2 12 12	NT (1	1 2	Protocols
P excretion	Optimum	turkey	kg/animal/yr	UNFCCC,	10.2, 12, 13,	National	1 x 3 yr	Calculated on the
				WFD, ND,	15, 16, 18, 19			basis of approved
D .	O 1:	1 1	1 / . 1/	NECD	10 2 12 12	NT (1	1 2	Protocols
P excretion	Optimum	ducks	kg/animal/yr	UNFCCC,	10.2, 12, 13,	National	1 x 3 yr	Calculated on the
				WFD, ND, NECD	15, 16, 18, 19			basis of approved Protocols
P excretion	0-1	- 4114	1 /	UNFCCC,	10 2 12 12	NI-4:1	1 2	Calculated on the
Pexcretion	Optimum	other poultry	kg/animal/yr	WFD, ND,	10.2, 12, 13,	National	1 x 3 yr	
				NECD	15, 16, 18, 19			basis of approved Protocols
P excretion	Ontingua	alacon	kg/animal/yr	UNFCCC,	10 2 12 12	National	1 2	Calculated on the
P excretion	Optimum	sheep	kg/ammai/yr	WFD, ND,	10.2, 12, 13,	National	1 x 3 yr	
				NECD	15, 16, 18, 19			basis of approved Protocols
P excretion	Optimum	cost	kg/animal/yr	UNFCCC,	10.2, 12, 13,	National	1 2	Calculated on the
P excretion	Оринин	goat	kg/ammai/yr	WFD, ND,	15, 16, 18, 19	National	1 x 3 yr	basis of approved
				NECD	15, 10, 16, 19			Protocols
P excretion	Optimum	horses	kg/animal/yr	UNFCCC,	10.2, 12, 13,	National	1 x 3 yr	Calculated on the
r excienon	Оринин	Hoises	kg/aiiiiiai/yi	WFD, ND,	15, 16, 18, 19	National	1 x 3 y1	basis of approved
				NECD	13, 10, 10, 19			Protocols
Biological	Minimum/	clover	kg N per ha	UNFCCC,	4, 12, 13, 15,	Regional	1 x 3 yr	Calculated on the
N fixation	optimum	Clovel	leguminous	WFD, ND	16, 18, 19	Regional	1 x 3 y1	basis of approved
1 N IIXAUOII	Opumum		crop per year	wib, ND	10, 10, 17			Protocols
Biological	Minimum/	peas	kg N per ha	UNFCCC,	4, 12, 13, 15,	Regional	1 x 3 yr	Calculated on the
N fixation	optimum	peas	leguminous	WFD, ND	16, 18, 19	Regional	1 A J Y1	basis of approved
IN HARHOH	opumum		crop per year	W1D, 1ND	10, 10, 17			Protocols
I		I	1 crop per year			1		1 10100013

Biological	Minimum/	beans	kg N per ha	UNFCCC,	4, 12, 13, 15,	Regional	1 x 3 yr	Calculated on the
N fixation	optimum		leguminous	WFD, ND	16, 18, 19			basis of approved
			crop per year					Protocols
Biological	Minimum/	soya bean	kg N per ha	UNFCCC,	4, 12, 13, 15,	Regional	1 x 3 yr	Calculated on the
N fixation	optimum		leguminous	WFD, ND	16, 18, 19			basis of approved
			crop per year					Protocols
Biological	Minimum/	lucerne	kg N per ha	UNFCCC,	4, 12, 13, 15,	Regional	1 x 3 yr	Calculated on the
N fixation	optimum		leguminous	WFD, ND	16, 18, 19			basis of approved
			crop per year					Protocols
Biological	Minimum/	lupins	kg N per ha	UNFCCC,	4, 12, 13, 15,	Regional	1 x 3 yr	Calculated on the
N fixation	optimum		leguminous	WFD, ND	16, 18, 19			basis of approved
			crop per year					Protocols

Table A4.3. Recommendations for collection of <u>data related to factors affecting emissions of ammonia and greenhouse gases.</u>
Two scenarios are included. The minimum scenario is the scenario with collection of data which are at least needed for reporting for policies and AEI (e.g. Tier 1) and the optimum scenario is the scenario for collection of data in detailed approaches (e.g. Tier 2 and 3 methods).

Type of data	Scenario	Data specification	Required data	Unit / dimension	Policy need	AEI need	Scale of	estimate	Source / method
		_					Spatial	Temporal	
Housing	minimum	dairy, beef,	Manure type;	Dimension	UNFCCC,	11.3, 12, 16,	Farm	1 x 5 yr	FSS; SAPM
system		and other cattle	Solid/liquid	less	ND, NECD	18, 19, 28			
Manure	minimum	dairy, beef,	Manure type;	Dimension	UNFCCC,	11.3, 12, 16,	Farm	1 x 5 yr	FSS; SAPM
storage system		and other cattle	Solid/liquid	less	ND, NECD	18, 19, 28			
Housing	optimum	dairy, beef,	tied housing with	Dimension	UNFCCC,	11.3, 12, 16,	Farm	1 x 5 yr	FSS; SAPM
system	Transfer in	and other	fully-slatted floor	less	ND, NECD	18, 19, 28			
Housing	optimum	dairy, beef,	tied housing partially	Dimension	UNFCCC,	11.3, 12, 16,	Farm	1 x 5 yr	FSS; SAPM
system	1	and other cattle	slatted floor	less	ND, NECD	18, 19, 28			ŕ
Housing	optimum	dairy, beef,	loose housing with	Dimension	UNFCCC,	11.3, 12, 16,	Farm	1 x 5 yr	FSS; SAPM
system	,	and other cattle	fully-slatted floor	less	ND, NECD	18, 19, 28			
Housing	optimum	dairy, beef,	loose housing partially	Dimension	UNFCCC,	11.3, 12, 16,	Farm	1 x 5 yr	FSS; SAPM
system		and other cattle	slatted floor	less	ND, NECD	18, 19, 28			
Housing	optimum	dairy, beef,	tied housing with	Dimension	UNFCCC,	11.3, 12, 16,	Farm	1 x 5 yr	FSS; SAPM
system	,	and other cattle	fully-slatted floor with scrubbers/biofilters	less	ND, NECD	18, 19, 28			·
Housing	optimum	dairy, beef,	tied housing partially	Dimension	UNFCCC,	11.3, 12, 16,	Farm	1 x 5 yr	FSS; SAPM
system		and other cattle	slatted floor with scrubbers/biofilters	less	ND, NECD	18, 19, 28			
Housing	optimum	dairy, beef,	loose housing with	Dimension	UNFCCC,	11.3, 12, 16,	Farm	1 x 5 yr	FSS; SAPM
system		and other cattle	fully-slatted floor with scrubbers/biofilters	less	ND, NECD	18, 19, 28			

Housing	optimum	dairy, beef,	loose housing partially	Dimension	UNFCCC,	11.3, 12, 16,	Farm	1 x 5 yr	FSS; SAPM
system		and other	slatted floor with	less	ND, NECD	18, 19, 28			
		cattle	scrubbers/biofilters						
Manure	optimum	dairy, beef,	solid	Dimension	UNFCCC,	11.3, 12, 16,	Farm	1 x 5 yr	FSS; SAPM
storage		and other		less	ND, NECD	18, 19, 28			
system		cattle							
Manure	optimum	dairy, beef,	liquid	Dimension	UNFCCC,	11.3, 12, 16,	Farm	1 x 5 yr	FSS; SAPM
storage		and other		less	ND, NECD	18, 19, 28			
system		cattle							
Manure	optimum	dairy, beef,	manure separation	Dimension	UNFCCC,	11.3, 12, 16,	Farm	1 x 5 yr	FSS; SAPM
storage		and other		less	ND, NECD	18, 19, 28			
system		cattle							
Manure	optimum	dairy, beef,	liquid with anaerobic	Dimension	UNFCCC,	11.3, 12, 16,	Farm	1 x 5 yr	FSS; SAPM
storage		and other	digestion without	less	ND, NECD	18, 19, 24, 28			
system		cattle	supplements						
Manure	optimum	dairy, beef,	liquid with anaerobic	Dimension	UNFCCC,	11.3, 12, 16,	Farm	1 x 5 yr	FSS; SAPM
storage		and other	digestion with	less	ND, NECD	18, 19, 24, 28			
system		cattle	supplements						
Housing	minimum	pigs	Solid	Dimension	UNFCCC,	11.3, 12, 16,	Farm	1 x 5 yr	FSS; SAPM
system				less	ND, NECD	18, 19, 28			
Housing	minimum	pigs	Liquid	Dimension	UNFCCC,	11.3, 12, 16,	Farm	1 x 5 yr	FSS; SAPM
system				less	ND, NECD	18, 19, 28			
Manure	minimum	pigs	Solid	Dimension	UNFCCC,	11.3, 12, 16,	Farm	1 x 5 yr	FSS; SAPM
storage				less	ND, NECD	18, 19, 28			
system									
Manure	minimum	pigs	Liquid	Dimension	UNFCCC,	11.3, 12, 16,	Farm	1 x 5 yr	FSS; SAPM
storage				less	ND, NECD	18, 19, 28			
system									
Housing	optimum	pigs	Solid	Dimension	UNFCCC,	11.3, 12, 16,	Farm	1 x 5 yr	FSS; SAPM
system				less	ND, NECD	18, 19, 28			
Housing	optimum	pigs	Liquid with	Dimension	UNFCCC,	11.3, 12, 16,	Farm	1 x 5 yr	FSS; SAPM
system			scrubbers/biofilters	less	ND, NECD	18, 19, 28			

Manure storage	optimum	pigs	solid	Dimension less	UNFCCC, ND, NECD	11.3, 12, 16, 18, 19, 28	Farm	1 x 5 yr	FSS; SAPM
Manure storage	optimum	pigs	liquid	Dimension less	UNFCCC, ND, NECD	11.3, 12, 16, 18, 19, 28	Farm	1 x 5 yr	FSS; SAPM
system Manure storage system	optimum	pigs	manure separation	Dimension less	UNFCCC, ND, NECD	11.3, 12, 16, 18, 19, 28	Farm	1 x 5 yr	FSS; SAPM
Manure storage	optimum	pigs	liquid with anaerobic digestion without supplements	Dimension less	UNFCCC, ND, NECD	11.3, 12, 16, 18, 19, 24, 28	Farm	1 x 5 yr	FSS; SAPM
system Manure storage system	optimum	pigs	liquid with anaerobic digestion with supplements	Dimension less	UNFCCC, ND, NECD	11.3, 12, 16, 18, 19, 24, 28	Farm	1 x 5 yr	FSS; SAPM
Housing system	minimum	poultry	Solid	Dimension less	UNFCCC, ND, NECD	11.3, 12, 16, 18, 19, 28	Farm	1 x 5 yr	FSS; SAPM
Housing system	minimum	poultry	Liquid	Dimension less	UNFCCC, ND, NECD	11.3, 12, 16, 18, 19, 28	Farm	1 x 5 yr	FSS; SAPM
Manure storage	minimum	poultry	Solid	Dimension less	UNFCCC, ND, NECD	11.3, 12, 16, 18, 19, 28	Farm	1 x 5 yr	FSS; SAPM
system Manure storage system	minimum	poultry	Liquid	Dimension less	UNFCCC, ND, NECD	11.3, 12, 16, 18, 19, 28	Farm	1 x 5 yr	FSS; SAPM
Housing system	optimum	poultry	Battery cages	Dimension less	UNFCCC, ND, NECD	11.3, 12, 16, 18, 19, 28	Farm	1 x 5 yr	FSS; SAPM
Housing system	optimum	poultry	Battery cages with drying	Dimension less	UNFCCC, ND, NECD	11.3, 12, 16, 18, 19, 28	Farm	1 x 5 yr	FSS; SAPM
Manure storage system	optimum	poultry	Free range	Dimension less	UNFCCC, ND, NECD	11.3, 12, 16, 18, 19, 28	Farm	1 x 5 yr	FSS; SAPM

Manure storage	optimum	poultry	Aviary house	Dimension less	UNFCCC, ND, NECD	11.3, 12, 16, 18, 19, 28	Farm	1 x 5 yr	FSS; SAPM
system Manure storage	optimum	poultry	Other	Dimension less	UNFCCC, ND, NECD	11.3, 12, 16, 18, 19, 28	Farm	1 x 5 yr	FSS; SAPM
system Manure storage	optimum	poultry	Solid	Dimension less	UNFCCC, ND, NECD	11.3, 12, 16, 18, 19, 28	Farm	1 x 5 yr	FSS; SAPM
system Manure storage	optimum	poultry	Liquid	Dimension less	UNFCCC, ND, NECD	11.3, 12, 16, 18, 19, 28	Farm	1 x 5 yr	FSS; SAPM
system Housing system	minimum	other	Solid	Dimension less	UNFCCC, ND, NECD	11.3, 12, 16, 18, 19, 28	Farm	1 x 5 yr	FSS; SAPM
Manure storage	minimum	other	Solid	Dimension less	UNFCCC, ND, NECD	11.3, 12, 16, 18, 19, 28	Farm	1 x 5 yr	FSS; SAPM
system Manure application	minimum	grassland and arable land	surface spreading	Dimension less	UNFCCC, ND, NECD	11.2, 12, 15, 16, 18, 19	Farm	1 x 3 yr	FSS; SAPM
technique Manure application	minimum	grassland and arable land	reduced ammonia application	Dimension less	UNFCCC, ND, NECD	11.2, 12, 15, 16, 18, 19	Farm	1 x 3 yr	FSS; SAPM
technique Manure application technique	optimum	grassland and arable land	Broadcast - no incorporation	Dimension less	UNFCCC, ND, NECD	11.2, 12, 15, 16, 18, 19	Farm	1 x 3 yr	FSS; SAPM
Manure application technique	optimum	arable land	Broadcast - incorporation <2hrs	Dimension less	UNFCCC, ND, NECD	11.2, 12, 15, 16, 18, 19	Farm	1 x 3 yr	FSS; SAPM
Manure application technique	optimum	arable land	Broadcast - incorporation <1 day	Dimension less	UNFCCC, ND, NECD	11.2, 12, 15, 16, 18, 19	Farm	1 x 3 yr	FSS; SAPM

Manure	optimum	grassland and	Band spread	Dimension	UNFCCC,	11.2, 12, 15,	Farm	1 x 3 yr	FSS; SAPM
application		arable land		less	ND, NECD	16, 18, 19			
technique									
Manure	optimum	grassland and	Deep injection	Dimension	UNFCCC,	11.2, 12, 15,	Farm	1 x 3 yr	FSS; SAPM
application		arable land		less	ND, NECD	16, 18, 19			
technique									
Manure	optimum	grassland and	Shallow injection	Dimension	UNFCCC,	11.2, 12, 15,	Farm	1 x 3 yr	FSS; SAPM
application		arable land		less	ND, NECD	16, 18, 19			
technique									

Table. A4.4. Recommendations for collection of coefficients related to factors affecting emissions of ammonia and greenhouse gases.

Two scenarios are included. The minimum scenario is the scenario with collection of data which are at least needed for reporting for policies and AEI (e.g. Tier 1) and the optimum scenario is the scenario for collection of data in detailed approaches (e.g. Tier 2 and 3 methods).

Type of data	Scenario	First data specification	Second data specification	Unit / dimension	Required coefficient	Policy need	AEI need	Scale of estimate		Source/method
			-					Spatial	Temporal	
Housing	minimum	dairy, beef,	Solid	% of N	ammonia	UNFCCC,	15, 16,	No;	1 x 5 yr	EEA/EMEP
system		and other		excreted	emission	ND,	18, 19	default		Guidebook
		cattle			factor	NECD				
Housing	minimum	dairy, beef,	Liquid	% of N	ammonia	UNFCCC,	15, 16,	No;	1 x 5 yr	EEA/EMEP
system		and other		excreted	emission	ND,	18, 19	default		Guidebook
•		cattle			factor	NECD				
Manure	minimum	dairy, beef,	Solid	% of N	ammonia	UNFCCC,	15, 16,	No;	1 x 5 yr	EEA/EMEP
storage		and other		excreted	emission	ND,	18, 19	default		Guidebook
system		cattle			factor	NECD				
Manure	minimum	dairy, beef,	Liquid	% of N	ammonia	UNFCCC,	15, 16,	National	1 x 5 yr	EEA/EMEP
storage		and other		excreted	emission	ND,	18, 19			Guidebook
system		cattle			factor	NECD				
Housing	optimum	dairy, beef,	tied housing with	% of N	ammonia	UNFCCC,	15, 16,	National	1 x 5 yr	EEA/EMEP
system	_	and other	fully-slatted floor	excreted	emission	ND,	18, 19			Guidebook
		cattle			factor	NECD				
Housing	optimum	dairy, beef,	tied housing	% of N	ammonia	UNFCCC,	15, 16,	National	1 x 5 yr	EEA/EMEP
system	_	and other	partially slatted	excreted	emission	ND,	18, 19			Guidebook
		cattle	floor		factor	NECD				
Housing	optimum	dairy, beef,	loose housing with	% of N	ammonia	UNFCCC,	15, 16,	National	1 x 5 yr	EEA/EMEP
system	_	and other	fully-slatted floor	excreted	emission	ND,	18, 19			Guidebook
		cattle			factor	NECD				
Housing	optimum	dairy, beef,	loose housing	% of N	ammonia	UNFCCC,	15, 16,	National	1 x 5 yr	EEA/EMEP
system	_	and other	partially slatted	excreted	emission	ND,	18, 19			Guidebook
		cattle	floor		factor	NECD				
Housing	optimum	dairy, beef,	tied housing with	% of N	ammonia	UNFCCC,	15, 16,	National	1 x 5 yr	EEA/EMEP
system		and other	fully-slatted floor	excreted	emission	ND,	18, 19			Guidebook

		cattle	with		factor	NECD				
Housing system	optimum	dairy, beef, and other cattle	scrubbers/biofilters tied housing partially slatted floor with	% of N excreted	ammonia emission factor	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	EEA/EMEP Guidebook
Housing system	optimum	dairy, beef, and other cattle	scrubbers/biofilters loose housing with fully-slatted floor with scrubbers/biofilters	% of N excreted	ammonia emission factor	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	EEA/EMEP Guidebook
Housing system	optimum	dairy, beef, and other cattle	loose housing partially slatted floor with scrubbers/biofilters	% of N excreted	ammonia emission factor	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	EEA/EMEP Guidebook
Manure storage system	optimum	dairy, beef, and other cattle	solid	% of N excreted	ammonia emission factor	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	EEA/EMEP Guidebook
Manure storage system	optimum	dairy, beef, and other cattle	liquid	% of N excreted	ammonia emission factor	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	EEA/EMEP Guidebook
Manure storage system	optimum	dairy, beef, and other cattle	manure separation	% of N excreted	ammonia emission factor	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	EEA/EMEP Guidebook
Manure storage system	optimum	dairy, beef, and other cattle	liquid with anaerobic digestion without supplements	% of N excreted	ammonia emission factor	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	EEA/EMEP Guidebook
Manure storage system	optimum	dairy, beef, and other cattle	liquid with anaerobic digestion with supplements	% of N excreted	ammonia emission factor	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	EEA/EMEP Guidebook
Housing system	minimum	pigs	Solid	% of N excreted	ammonia emission factor	UNFCCC, ND, NECD	15, 16, 18, 19	No; default	1 x 5 yr	EEA/EMEP Guidebook

Housing	minimum	pigs	Liquid	% of N	ammonia	UNFCCC,	15, 16,	No;	1 x 5 yr	EEA/EMEP
system				excreted	emission	ND,	18, 19	default	·	Guidebook
					factor	NECD				
Manure	minimum	pigs	Solid	% of N	ammonia	UNFCCC,	15, 16,	No;	1 x 5 yr	EEA/EMEP
storage				excreted	emission	ND,	18, 19	default		Guidebook
system					factor	NECD				
Manure	minimum	pigs	Liquid	% of N	ammonia	UNFCCC,	15, 16,	No;	1 x 5 yr	EEA/EMEP
storage				excreted	emission	ND,	18, 19	default		Guidebook
system					factor	NECD				
Housing	optimum	pigs	Solid	% of N	ammonia	UNFCCC,	15, 16,	National	1 x 5 yr	EEA/EMEP
system				excreted	emission	ND,	18, 19			Guidebook
					factor	NECD				
Housing	optimum	pigs	Liquid with	% of N	ammonia	UNFCCC,	15, 16,	National	1 x 5 yr	EEA/EMEP
system			scrubbers/biofilters	excreted	emission	ND,	18, 19			Guidebook
					factor	NECD				
Manure	optimum	pigs	solid	% of N	ammonia	UNFCCC,	15, 16,	National	1 x 5 yr	EEA/EMEP
storage				excreted	emission	ND,	18, 19			Guidebook
system					factor	NECD				
Manure	optimum	pigs	liquid	% of N	ammonia	UNFCCC,	15, 16,	National	1 x 5 yr	EEA/EMEP
storage				excreted	emission	ND,	18, 19			Guidebook
system					factor	NECD				
Manure	optimum	pigs	manure separation	% of N	ammonia	UNFCCC,	15, 16,	National	1 x 5 yr	EEA/EMEP
storage				excreted	emission	ND,	18, 19			Guidebook
system					factor	NECD				
Manure	optimum	pigs	liquid with	% of N	ammonia	UNFCCC,	15, 16,	National	1 x 5 yr	EEA/EMEP
storage			anaerobic digestion	excreted	emission	ND,	18, 19			Guidebook
system			without		factor	NECD				
			supplements							
Manure	optimum	pigs	liquid with	% of N	ammonia	UNFCCC,	15, 16,	National	1 x 5 yr	EEA/EMEP
storage			anaerobic digestion	excreted	emission	ND,	18, 19			Guidebook
system			with supplements		factor	NECD			_	
Housing	minimum	poultry	Solid	% of N	ammonia	UNFCCC,	15, 16,	No;	1 x 5 yr	EEA/EMEP
system				excreted	emission	ND,	18, 19	default		Guidebook

					factor	NECD				
Housing system	minimum	poultry	Liquid	% of N excreted	ammonia emission	UNFCCC, ND,	15, 16, 18, 19	No; default	1 x 5 yr	EEA/EMEP Guidebook
Manure storage	minimum	poultry	Solid	% of N excreted	factor ammonia emission	NECD UNFCCC, ND,	15, 16, 18, 19	No; default	1 x 5 yr	EEA/EMEP Guidebook
Manure storage	minimum	poultry	Liquid	% of N excreted	factor ammonia emission	NECD UNFCCC, ND, NECD	15, 16, 18, 19	No; default	1 x 5 yr	EEA/EMEP Guidebook
system Housing system	optimum	poultry	Battery cages	% of N excreted	factor ammonia emission factor	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	EEA/EMEP Guidebook
Housing system	optimum	poultry	Battery cages with drying	% of N excreted	ammonia emission factor	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	EEA/EMEP Guidebook
Manure storage	optimum	poultry	Free range	% of N excreted	ammonia emission factor	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	EEA/EMEP Guidebook
system Manure storage	optimum	poultry	Aviary house	% of N excreted	ammonia emission factor	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	EEA/EMEP Guidebook
system Manure storage system	optimum	poultry	Other	% of N excreted	ammonia emission factor	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	EEA/EMEP Guidebook
Manure storage system	optimum	poultry	Solid	% of N excreted	ammonia emission factor	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	EEA/EMEP Guidebook
Manure storage system	optimum	poultry	Liquid	% of N excreted	ammonia emission factor	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	EEA/EMEP Guidebook

Housing	minimum	other	Solid	% of N	ammonia	UNFCCC,	15, 16,	No;	1 x 5 yr	EEA/EMEP
system				excreted	emission	ND,	18, 19	default		Guidebook
					factor	NECD				
Manure	minimum	other	Solid	% of N	ammonia	UNFCCC,	15, 16,	No;	1 x 5 yr	EEA/EMEP
storage				excreted	emission	ND,	18, 19	default		Guidebook
system					factor	NECD				
Manure	minimum	grassland and	surface spreading	% of N	ammonia	UNFCCC,	15, 16,	No;	1 x 5 yr	EEA/EMEP
application		arable land		applied	emission	ND,	18, 19	default		Guidebook
technique					factor	NECD				
Manure	minimum	grassland and	reduced ammonia	% of N	ammonia	UNFCCC,	15, 16,	No;	1 x 5 yr	EEA/EMEP
application		arable land	application	applied	emission	ND,	18, 19	default		Guidebook
technique					factor	NECD				
Manure	optimum	grassland and	Broadcast - no	% of N	ammonia	UNFCCC,	15, 16,	National	1 x 5 yr	EEA/EMEP
application		arable land	incorporation	applied	emission	ND,	18, 19			Guidebook
technique					factor	NECD				
Manure	optimum	arable land	Broadcast -	% of N	ammonia	UNFCCC,	15, 16,	National	1 x 5 yr	EEA/EMEP
application			incorporation	applied	emission	ND,	18, 19			Guidebook
technique			<2hrs		factor	NECD				
Manure	optimum	arable land	Broadcast -	% of N	ammonia	UNFCCC,	15, 16,	National	1 x 5 yr	EEA/EMEP
application			incorporation <1	applied	emission	ND,	18, 19			Guidebook
technique			day		factor	NECD				
Manure	optimum	grassland and	Band spread	% of N	ammonia	UNFCCC,	15, 16,	National	1 x 5 yr	EEA/EMEP
application		arable land		applied	emission	ND,	18, 19			Guidebook
technique					factor	NECD				
Manure	optimum	grassland and	Deep injection	% of N	ammonia	UNFCCC,	15, 16,	National	1 x 5 yr	EEA/EMEP
application		arable land		applied	emission	ND,	18, 19			Guidebook
technique					factor	NECD				
Manure	optimum	grassland and	Shallow injection	% of N	ammonia	UNFCCC,	15, 16,	National	1 x 5 yr	EEA/EMEP
application		arable land		applied	emission	ND,	18, 19			Guidebook
technique				1	factor	NECD				
N fertilizer	Minimum/	ammonium		% of N	ammonia	UNFCCC,	15, 16,	No;	1 x 5 yr	EEA/EMEP
	optimum	nitrate		applied	emission	ND,	18, 19	default		Guidebook
					factor	NECD				

N fertilizer	Minimum/	calcium		% of N	ammonia	UNFCCC,	15, 16,	No;	1 x 5 yr	EEA/EMEP
consumption	optimum	ammonium		applied	emission	ND,	18, 19	default		Guidebook
		nitrate			factor	NECD				
N fertilizer	Minimum/	anhydrous		% of N	ammonia	UNFCCC,	15, 16,	No;	1 x 5 yr	EEA/EMEP
consumption	optimum	ammonia		applied	emission	ND,	18, 19	default		Guidebook
					factor	NECD				
N fertilizer	Minimum/	ammonium		% of N	ammonia	UNFCCC,	15, 16,	No;	1 x 5 yr	EEA/EMEP
consumption	optimum	phosphate		applied	emission	ND,	18, 19	default		Guidebook
					factor	NECD				
N fertilizer	Minimum/	urea		% of N	ammonia	UNFCCC,	15, 16,	No;	1 x 5 yr	EEA/EMEP
consumption	optimum			applied	emission	ND,	18, 19	default		Guidebook
					factor	NECD				
N fertilizer	Minimum/	urea-		% of N	ammonia	UNFCCC,	15, 16,	No;	1 x 5 yr	EEA/EMEP
consumption	optimum	ammonium		applied	emission	ND,	18, 19	default		Guidebook
		nitrate			factor	NECD				
		solution								
		(UAN)								
N fertilizer	Minimum/	other N		% of N	ammonia	UNFCCC,	15, 16,	No;	1 x 5 yr	EEA/EMEP
consumption	optimum	fertilizers		applied	emission	ND,	18, 19	default		Guidebook
					factor	NECD				
Grazing	Minimum/	grazing		% of N	ammonia	UNFCCC,	15, 16,	No;	1 x 5 yr	EEA/EMEP
	optimum	livestock		excreted	emission	ND,	18, 19	default		Guidebook
				during	factor	NECD				
				grazing						
Housing	minimum	dairy, beef,	Solid	% of N	nitrous oxide	UNFCCC,	15, 16,	No;	1 x 5 yr	IPPC
system		and other		excreted	emission	ND,	18, 19	default		methodology
		cattle			factor	NECD			_	
Housing	minimum	dairy, beef,	Liquid	% of N	nitrous oxide	UNFCCC,	15, 16,	No;	1 x 5 yr	IPPC
system		and other		excreted	emission	ND,	18, 19	default		methodology
		cattle			factor	NECD				
Manure	minimum	dairy, beef,	Solid	% of N	nitrous oxide	UNFCCC,	15, 16,	No;	1 x 5 yr	IPPC
storage		and other		excreted	emission	ND,	18, 19	default		methodology
system		cattle			factor	NECD				

Manur	re mi	dairy, beef,	Liquid	% of N	nitrous oxide	UNFCCC,	15, 16,	National	1 x 5 yr	IPPC
storage	e	and other		excreted	emission	ND,	18, 19			methodology
system		cattle			factor	NECD				
Housin	ng opt	dairy, beef,	tied housing with	% of N	nitrous oxide	UNFCCC,	15, 16,	National	1 x 5 yr	IPPC
system	ı	and other	fully-slatted floor	excreted	emission	ND,	18, 19			methodology
		cattle			factor	NECD				
Housin	ng opt	dairy, beef,	tied housing	% of N	nitrous oxide	UNFCCC,	15, 16,	National	1 x 5 yr	IPPC
system	ı	and other	partially slatted	excreted	emission	ND,	18, 19			methodology
		cattle	floor		factor	NECD				
Housin	ng opt	dairy, beef,	loose housing with	% of N	nitrous oxide	UNFCCC,	15, 16,	National	1 x 5 yr	IPPC
system	ı	and other	fully-slatted floor	excreted	emission	ND,	18, 19			methodology
		cattle			factor	NECD				
Housin	ng opt	dairy, beef,	loose housing	% of N	nitrous oxide	UNFCCC,	15, 16,	National	1 x 5 yr	IPPC
system	ı	and other	partially slatted	excreted	emission	ND,	18, 19			methodology
		cattle	floor		factor	NECD				
Housin	ng opt	dairy, beef,	tied housing with	% of N	nitrous oxide	UNFCCC,	15, 16,	National	1 x 5 yr	IPPC
system	ı	and other	fully-slatted floor	excreted	emission	ND,	18, 19			methodology
		cattle	with		factor	NECD				
			scrubbers/biofilters							
Housin	ng opt	dairy, beef,	tied housing	% of N	nitrous oxide	UNFCCC,	15, 16,	National	1 x 5 yr	IPPC
system	l	and other	partially slatted	excreted	emission	ND,	18, 19			methodology
		cattle	floor with		factor	NECD				
			scrubbers/biofilters							
Housin	ng opt	dairy, beef,	loose housing with	% of N	nitrous oxide	UNFCCC,	15, 16,	National	1 x 5 yr	IPPC
system	l	and other	fully-slatted floor	excreted	emission	ND,	18, 19			methodology
		cattle	with		factor	NECD				
			scrubbers/biofilters							
Housin	ng opt	dairy, beef,	loose housing	% of N	nitrous oxide	UNFCCC,	15, 16,	National	1 x 5 yr	IPPC
system	l	and other	partially slatted	excreted	emission	ND,	18, 19			methodology
		cattle	floor with		factor	NECD				
			scrubbers/biofilters							
Manur	re opt	dairy, beef,	solid	% of N	nitrous oxide	UNFCCC,	15, 16,	National	1 x 5 yr	IPPC
storage	e	and other		excreted	emission	ND,	18, 19			methodology

system		cattle			factor	NECD				
Manure	optimum	dairy, beef,	liquid	% of N	nitrous oxide	UNFCCC,	15, 16,	National	1 x 5 yr	IPPC
storage		and other		excreted	emission	ND,	18, 19			methodology
system		cattle		0/ 631	factor	NECD	45 46	NT 1	4 5	IDDC
Manure	optimum	dairy, beef,	manure separation	% of N	nitrous oxide	UNFCCC,	15, 16,	National	1 x 5 yr	IPPC
storage		and other		excreted	emission	ND,	18, 19			methodology
system		cattle	1: :1 :/1	0/ (N)	factor	NECD	15 16	NT . 1	1 [IDDC
Manure	optimum	dairy, beef,	liquid with	% of N	nitrous oxide	UNFCCC,	15, 16,	National	1 x 5 yr	IPPC
storage		and other	anaerobic digestion	excreted	emission	ND,	18, 19			methodology
system		cattle	without		factor	NECD				
M		1.: 1	supplements	% of N		LINIECCC	15 17	NI-4:1	1 E	IPPC
Manure	optimum	dairy, beef, and other	liquid with		nitrous oxide	UNFCCC,	15, 16,	National	1 x 5 yr	
storage		cattle	anaerobic digestion	excreted	emission factor	ND, NECD	18, 19			methodology
system	minimum		with supplements Solid	% of N	nitrous oxide	UNFCCC,	15, 16,	No;	1 55 5 554	IPPC
Housing	111111111111111111111111111111111111111	pigs	Sond	excreted	emission	ND,	18, 19	default	1 x 5 yr	methodology
system				excreted	factor	NECD	10, 19	derauit		methodology
Housing	minimum	pigs	Liquid	% of N	nitrous oxide	UNFCCC,	15, 16,	No;	1 x 5 yr	IPPC
system	IIIIIIIIIIIIII	pigs	Liquid	excreted	emission	ND,	18, 19	default	1 X 3 y1	methodology
System				CXCICICU	factor	NECD	10, 17	uciaun		incurodology
Manure	minimum	pigs	Solid	% of N	nitrous oxide	UNFCCC,	15, 16,	No;	1 x 5 yr	IPPC
storage	miniminam	P183	Sona	excreted	emission	ND,	18, 19	default	1 X 3 y1	methodology
system				CACICICA	factor	NECD	10, 17	acraare		mediodology
Manure	minimum	pigs	Liquid	% of N	nitrous oxide	UNFCCC,	15, 16,	No;	1 x 5 yr	IPPC
storage		1-9"		excreted	emission	ND,	18, 19	default	,-	methodology
system					factor	NECD		0.0 20.0.20		
Housing	optimum	pigs	Solid	% of N	nitrous oxide	UNFCCC,	15, 16,	National	1 x 5 yr	IPPC
system	1			excreted	emission	ND,	18, 19		,	methodology
					factor	NECD				G)
Housing	optimum	pigs	Liquid with	% of N	nitrous oxide	UNFCCC,	15, 16,	National	1 x 5 yr	IPPC
system	^		scrubbers/biofilters	excreted	emission	ND,	18, 19		,	methodology
					factor	NECD	•			

Manure	optimum	pigs	solid	% of N	nitrous oxide	UNFCCC,	15, 16,	National	1 x 5 yr	IPPC
storage				excreted	emission	ND,	18, 19			methodology
system					factor	NECD				
Manure	optimum	pigs	liquid	% of N	nitrous oxide	UNFCCC,	15, 16,	National	1 x 5 yr	IPPC
storage	1		1	excreted	emission	ND,	18, 19		,	methodology
system					factor	NECD				0,
Manure	optimum	pigs	manure separation	% of N	nitrous oxide	UNFCCC,	15, 16,	National	1 x 5 yr	IPPC
storage	1		1	excreted	emission	ND,	18, 19		,	methodology
system					factor	NECD	•			0,
Manure	optimum	pigs	liquid with	% of N	nitrous oxide	UNFCCC,	15, 16,	National	1 x 5 yr	IPPC
storage			anaerobic digestion	excreted	emission	ND,	18, 19		,	methodology
system			without		factor	NECD	Í			0,
			supplements							
Manure	optimum	pigs	liquid with	% of N	nitrous oxide	UNFCCC,	15, 16,	National	1 x 5 yr	IPPC
storage	1		anaerobic digestion	excreted	emission	ND,	18, 19		,	methodology
system			with supplements		factor	NECD	•			O,
Housing	minimum	poultry	Solid	% of N	nitrous oxide	UNFCCC,	15, 16,	No;	1 x 5 yr	IPPC
system				excreted	emission	ND,	18, 19	default	,	methodology
					factor	NECD	•			0,
Housing	minimum	poultry	Liquid	% of N	nitrous oxide	UNFCCC,	15, 16,	No;	1 x 5 yr	IPPC
system			1	excreted	emission	ND,	18, 19	default	,	methodology
					factor	NECD				
Manure	minimum	poultry	Solid	% of N	nitrous oxide	UNFCCC,	15, 16,	No;	1 x 5 yr	IPPC
storage				excreted	emission	ND,	18, 19	default		methodology
system					factor	NECD				
Manure	minimum	poultry	Liquid	% of N	nitrous oxide	UNFCCC,	15, 16,	No;	1 x 5 yr	IPPC
storage				excreted	emission	ND,	18, 19	default		methodology
system					factor	NECD				
Housing	optimum	poultry	Battery cages	% of N	nitrous oxide	UNFCCC,	15, 16,	National	1 x 5 yr	IPPC
system				excreted	emission	ND,	18, 19		-	methodology
					factor	NECD				
Housing	optimum	poultry	Battery cages with	% of N	nitrous oxide	UNFCCC,	15, 16,	National	1 x 5 yr	IPPC
system			drying	excreted	emission	ND,	18, 19			methodology

					factor	NECD				
Manure storage	optimum	poultry	Free range	% of N excreted	nitrous oxide emission	UNFCCC, ND,	15, 16, 18, 19	National	1 x 5 yr	IPPC methodology
Manure storage	optimum	poultry	Aviary house	% of N excreted	factor nitrous oxide emission	NECD UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	IPPC methodology
Manure storage	optimum	poultry	Other	% of N excreted	factor nitrous oxide emission factor	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	IPPC methodology
system Manure storage	optimum	poultry	Solid	% of N excreted	nitrous oxide emission factor	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	IPPC methodology
system Manure storage	optimum	poultry	Liquid	% of N excreted	nitrous oxide emission factor	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	IPPC methodology
system Housing system	minimum	other	Solid	% of N excreted	nitrous oxide emission factor	UNFCCC, ND, NECD	15, 16, 18, 19	No; default	1 x 5 yr	IPPC methodology
Manure storage system	minimum	other	Solid	% of N excreted	nitrous oxide emission factor	UNFCCC, ND, NECD	15, 16, 18, 19	No; default	1 x 5 yr	IPPC methodology
Manure application technique	minimum	grassland and arable land	surface spreading	% of N applied	nitrous oxide emission factor	UNFCCC, ND, NECD	15, 16, 18, 19	No; default	1 x 5 yr	IPPC methodology
Manure application technique	minimum	grassland and arable land	reduced ammonia application	% of N applied	nitrous oxide emission factor	UNFCCC, ND, NECD	15, 16, 18, 19	No; default	1 x 5 yr	IPPC methodology
Manure application technique	optimum	grassland and arable land	Broadcast - no incorporation	% of N applied	nitrous oxide emission factor	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	IPPC methodology

Manure	optimum	arable land	Broadcast -	% of N	nitrous oxide	UNFCCC,	15, 16,	National	1 x 5 yr	IPPC
application			incorporation	applied	emission	ND,	18, 19			methodology
technique			<2hrs		factor	NECD				
Manure	optimum	arable land	Broadcast -	% of N	nitrous oxide	UNFCCC,	15, 16,	National	1 x 5 yr	IPPC
application			incorporation <1	applied	emission	ND,	18, 19			methodology
technique			day		factor	NECD				
Manure	optimum	grassland and	Band spread	% of N	nitrous oxide	UNFCCC,	15, 16,	National	1 x 5 yr	IPPC
application		arable land	_	applied	emission	ND,	18, 19			methodology
technique					factor	NECD				
Manure	optimum	grassland and	Deep injection	% of N	nitrous oxide	UNFCCC,	15, 16,	National	1 x 5 yr	IPPC
application		arable land		applied	emission	ND,	18, 19			methodology
technique					factor	NECD				
Manure	optimum	grassland and	Shallow injection	% of N	nitrous oxide	UNFCCC,	15, 16,	National	1 x 5 yr	IPPC
application		arable land		applied	emission	ND,	18, 19			methodology
technique					factor	NECD				
N fertilizer	Minimum/	ammonium		% of N	nitrous oxide	UNFCCC,	15, 16,	No;	1 x 5 yr	IPPC
	optimum	nitrate		applied	emission	ND,	18, 19	default		methodology
					factor	NECD				
N fertilizer	Minimum/	calcium		% of N	nitrous oxide	UNFCCC,	15, 16,	No;	1 x 5 yr	IPPC
consumption	optimum	ammonium		applied	emission	ND,	18, 19	default		methodology
		nitrate			factor	NECD				
N fertilizer	Minimum/	anhydrous		% of N	nitrous oxide	UNFCCC,	15, 16,	No;	1 x 5 yr	IPPC
consumption	optimum	ammonia		applied	emission	ND,	18, 19	default		methodology
					factor	NECD				
N fertilizer	Minimum/	ammonium		% of N	nitrous oxide	UNFCCC,	15, 16,	No;	1 x 5 yr	IPPC
consumption	optimum	phosphate		applied	emission	ND,	18, 19	default		methodology
					factor	NECD				
N fertilizer	Minimum/	urea		% of N	nitrous oxide	UNFCCC,	15, 16,	No;	1 x 5 yr	IPPC
consumption	optimum			applied	emission	ND,	18, 19	default		methodology
					factor	NECD				
N fertilizer	Minimum/	urea-		% of N	nitrous oxide	UNFCCC,	15, 16,	No;	1 x 5 yr	IPPC
consumption	optimum	ammonium		applied	emission	ND,	18, 19	default		methodology
		nitrate			factor	NECD				

N fertilizer consumption Grazing	Minimum/ optimum	solution (UAN) other N fertilizers		% of N applied % of N	nitrous oxide emission factor nitrous oxide	UNFCCC, ND, NECD UNFCCC,	15, 16, 18, 19	No; default	1 x 5 yr 1 x 5 yr	IPPC methodology
Grazing		livestock		excreted during grazing	emission factor	ND, NECD	18, 19	default	1 x 3 y1	methodology
Crop residues				% in crop residue	nitrous oxide emission factor	UNFCCC, ND, NECD	15, 16, 18, 19	No; default	1 x 5 yr	IPPC methodology
Housing system	minimum	dairy, beef, and other cattle	Solid	% of N excreted	total denitrification loss	UNFCCC, ND, NECD	15, 16, 18, 19	No; default	1 x 5 yr	IPPC methodology/ EEA/EMEP Guidebook
Housing system	minimum	dairy, beef, and other cattle	Liquid	% of N excreted	total denitrification loss	UNFCCC, ND, NECD	15, 16, 18, 19	No; default	1 x 5 yr	IPPC methodology/ EEA/EMEP Guidebook
Manure storage system	minimum	dairy, beef, and other cattle	Solid	% of N excreted	total denitrification loss	UNFCCC, ND, NECD	15, 16, 18, 19	No; default	1 x 5 yr	IPPC methodology/ EEA/EMEP Guidebook
Manure storage system	minimum	dairy, beef, and other cattle	Liquid	% of N excreted	total denitrification loss	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	IPPC methodology/ EEA/EMEP Guidebook
Housing system	optimum	dairy, beef, and other cattle	tied housing with fully-slatted floor	% of N excreted	total denitrification loss	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	IPPC methodology/ EEA/EMEP Guidebook

Housing system	optimum	dairy, beef, and other cattle	tied housing partially slatted floor	% of N excreted	total denitrification loss	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	IPPC methodology/ EEA/EMEP Guidebook
Housing system	optimum	dairy, beef, and other cattle	loose housing with fully-slatted floor	% of N excreted	total denitrification loss	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	IPPC methodology/ EEA/EMEP Guidebook
Housing system	optimum	dairy, beef, and other cattle	loose housing partially slatted floor	% of N excreted	total denitrification loss	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	IPPC methodology/ EEA/EMEP Guidebook
Housing system	optimum	dairy, beef, and other cattle	tied housing with fully-slatted floor with scrubbers/biofilters	% of N excreted	total denitrification loss	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	IPPC methodology/ EEA/EMEP Guidebook
Housing system	optimum	dairy, beef, and other cattle	tied housing partially slatted floor with scrubbers/biofilters	% of N excreted	total denitrification loss	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	IPPC methodology/ EEA/EMEP Guidebook
Housing system	optimum	dairy, beef, and other cattle	loose housing with fully-slatted floor with scrubbers/biofilters	% of N excreted	total denitrification loss	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	IPPC methodology/ EEA/EMEP Guidebook
Housing system	optimum	dairy, beef, and other cattle	loose housing partially slatted floor with scrubbers/biofilters	% of N excreted	total denitrification loss	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	IPPC methodology/ EEA/EMEP Guidebook
Manure storage system	optimum	dairy, beef, and other cattle	solid	% of N excreted	total denitrification loss	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	IPPC methodology/ EEA/EMEP Guidebook

Manure storage system	optimum	dairy, beef, and other cattle	liquid	% of N excreted	total denitrification loss	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	IPPC methodology/ EEA/EMEP Guidebook
Manure storage system	optimum	dairy, beef, and other cattle	manure separation	% of N excreted	total denitrification loss	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	IPPC methodology/ EEA/EMEP Guidebook
Manure storage system	optimum	dairy, beef, and other cattle	liquid with anaerobic digestion without supplements	% of N excreted	total denitrification loss	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	IPPC methodology/ EEA/EMEP Guidebook
Manure storage system	optimum	dairy, beef, and other cattle	liquid with anaerobic digestion with supplements	% of N excreted	total denitrification loss	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	IPPC methodology/ EEA/EMEP Guidebook
Housing system	minimum	pigs	Solid	% of N excreted	total denitrification loss	UNFCCC, ND, NECD	15, 16, 18, 19	No; default	1 x 5 yr	IPPC methodology/ EEA/EMEP Guidebook
Housing system	minimum	pigs	Liquid	% of N excreted	total denitrification loss	UNFCCC, ND, NECD	15, 16, 18, 19	No; default	1 x 5 yr	IPPC methodology/ EEA/EMEP Guidebook
Manure storage system	minimum	pigs	Solid	% of N excreted	total denitrification loss	UNFCCC, ND, NECD	15, 16, 18, 19	No; default	1 x 5 yr	IPPC methodology/ EEA/EMEP Guidebook
Manure storage system	minimum	pigs	Liquid	% of N excreted	total denitrification loss	UNFCCC, ND, NECD	15, 16, 18, 19	No; default	1 x 5 yr	IPPC methodology/ EEA/EMEP Guidebook

Housing system	optimum	pigs	Solid	% of N excreted	total denitrification loss	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	IPPC methodology/ EEA/EMEP Guidebook
Housing system	optimum	pigs	Liquid with scrubbers/biofilters	% of N excreted	total denitrification loss	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	IPPC methodology/ EEA/EMEP Guidebook
Manure storage system	optimum	pigs	solid	% of N excreted	total denitrification loss	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	IPPC methodology/ EEA/EMEP Guidebook
Manure storage system	optimum	pigs	liquid	% of N excreted	total denitrification loss	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	IPPC methodology/ EEA/EMEP Guidebook
Manure storage system	optimum	pigs	manure separation	% of N excreted	total denitrification loss	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	IPPC methodology/ EEA/EMEP Guidebook
Manure storage system	optimum	pigs	liquid with anaerobic digestion without supplements	% of N excreted	total denitrification loss	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	IPPC methodology/ EEA/EMEP Guidebook
Manure storage system	optimum	pigs	liquid with anaerobic digestion with supplements	% of N excreted	total denitrification loss	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	IPPC methodology/ EEA/EMEP Guidebook
Housing system	minimum	poultry	Solid	% of N excreted	total denitrification loss	UNFCCC, ND, NECD	15, 16, 18, 19	No; default	1 x 5 yr	IPPC methodology/ EEA/EMEP Guidebook

Housing system	minimum	poultry	Liquid	% of N excreted	total denitrification loss	UNFCCC, ND, NECD	15, 16, 18, 19	No; default	1 x 5 yr	IPPC methodology/ EEA/EMEP Guidebook
Manure storage system	minimum	poultry	Solid	% of N excreted	total denitrification loss	UNFCCC, ND, NECD	15, 16, 18, 19	No; default	1 x 5 yr	IPPC methodology/ EEA/EMEP Guidebook
Manure storage system	minimum	poultry	Liquid	% of N excreted	total denitrification loss	UNFCCC, ND, NECD	15, 16, 18, 19	No; default	1 x 5 yr	IPPC methodology/ EEA/EMEP Guidebook
Housing system	optimum	poultry	Battery cages	% of N excreted	total denitrification loss	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	IPPC methodology/ EEA/EMEP Guidebook
Housing system	optimum	poultry	Battery cages with drying	% of N excreted	total denitrification loss	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	IPPC methodology/ EEA/EMEP Guidebook
Manure storage system	optimum	poultry	Free range	% of N excreted	total denitrification loss	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	IPPC methodology/ EEA/EMEP Guidebook
Manure storage system	optimum	poultry	Aviary house	% of N excreted	total denitrification loss	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	IPPC methodology/ EEA/EMEP Guidebook
Manure storage system	optimum	poultry	Other	% of N excreted	total denitrification loss	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	IPPC methodology/ EEA/EMEP Guidebook

Manure storage system	optimum	poultry	Solid	% of N excreted	total denitrification loss	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	IPPC methodology/ EEA/EMEP Guidebook
Manure storage system	optimum	poultry	Liquid	% of N excreted	total denitrification loss	UNFCCC, ND, NECD	15, 16, 18, 19	National	1 x 5 yr	IPPC methodology/ EEA/EMEP Guidebook
Housing system	minimum	other	Solid	% of N excreted	total denitrification loss	UNFCCC, ND, NECD	15, 16, 18, 19	No; default	1 x 5 yr	IPPC methodology/ EEA/EMEP Guidebook
Manure storage system	minimum	other	Solid	% of N excreted	total denitrification loss	UNFCCC, ND, NECD	15, 16, 18, 19	No; default	1 x 5 yr	IPPC methodology/ EEA/EMEP Guidebook
Housing system	minimum	dairy, beef, and other cattle	Enteric fermentation	kg CH4/ animal/yr	methane emission factor	UNFCCC	19	No; default	1 x 5 yr	IPCC methodology
Manure storage system	minimum	dairy, beef, and other cattle	Solid	kg CH4/ animal/yr	methane emission factor	UNFCCC	19	No; default	1 x 5 yr	IPCC methodology
Manure storage system	minimum	dairy, beef, and other cattle	Liquid	kg CH4/ animal/yr	methane emission factor	UNFCCC	19	No; default	1 x 5 yr	IPCC methodology
Housing system	minimum	pigs	Enteric fermentation	kg CH4/ animal/yr	methane emission factor	UNFCCC	19	No; default	1 x 5 yr	IPCC methodology
Manure storage system	minimum	pigs	Solid	kg CH4/ animal/yr	methane emission factor	UNFCCC	19	No; default	1 x 5 yr	IPCC methodology
Manure storage	minimum	pigs	Liquid	kg CH4/ animal/yr	methane emission	UNFCCC	19	No; default	1 x 5 yr	IPCC methodology

system					factor					
Manure storage system	minimum	poultry	Solid	kg CH4/ animal/yr	methane emission factor	UNFCCC	19	No; default	1 x 5 yr	IPCC methodology
Manure storage system	minimum	poultry	Liquid	kg CH4/ animal/yr	methane emission factor	UNFCCC	19	No; default	1 x 5 yr	IPCC methodology
Housing system	minimum	other	Enteric fermentation	kg CH4/ animal/yr	methane emission factor	UNFCCC	19	No; default	1 x 5 yr	IPCC methodology
Manure storage system	minimum	other	Solid	kg CH4/ animal/yr	methane emission factor	UNFCCC	19	No; default	1 x 5 yr	IPCC methodology
Manure storage system	minimum	other	Liquid	kg CH4/ animal/yr	methane emission factor	UNFCCC	19	No; default	1 x 5 yr	IPCC methodology

Table A4.5. Recommendations for collection of <u>data related to N and P in harvested crop products</u>.

Two scenarios are included. The minimum scenario is the scenario with collection of data which are at least needed for reporting for policies and AEI (e.g. Tier 1) and the optimum scenario is the scenario for collection of data in detailed approaches (e.g. Tier 2 and 3 methods).

Type of data	Scenario	Data specification	Unit / dimension	Policy need	AEI need	Scale of collection		Source/method
		specification	differision			Spatial	Temporal	
Crop type	Ontinguage	2 # 2 2	le o	LINECCC LULLICE	F (7 9 0 10 1	-		FSS
Wheat	Optimum	area	ha	UNFCCC, LULUCF,	5, 6, 7, 8, 9, 10.1,	Farm	Annual	F33
				ND, NECD, FDSUP,	10.2, 11.1, 15, 16, 26			
				RDP		_		F00
Rye	Optimum	area	ha	UNFCCC, LULUCF,	5, 6, 7, 8, 9, 10.1,	Farm	Annual	FSS
				ND, NECD, FDSUP,	10.2, 11.1, 15, 16, 26			
				RDP				
Barley	Optimum	area	ha	UNFCCC, LULUCF,	5, 6, 7, 8, 9, 10.1,	Farm	Annual	FSS
				ND, NECD, FDSUP,	10.2, 11.1, 15, 16, 26			
				RDP				
Spring	Optimum	area	ha	UNFCCC, LULUCF,	5, 6, 7, 8, 9, 10.1,	Farm	Annual	FSS
barley				ND, NECD, FDSUP,	10.2, 11.1, 15, 16, 26			
				RDP				
Oats	Optimum	area	ha	UNFCCC, LULUCF,	5, 6, 7, 8, 9, 10.1,	Farm	Annual	FSS
	1			ND, NECD, FDSUP,	10.2, 11.1, 15, 16, 26			
				RDP				
Grain	Optimum	area	ha	UNFCCC, LULUCF,	5, 6, 7, 8, 9, 10.1,	Farm	Annual	FSS
maize	1			ND, NECD, FDSUP,	10.2, 11.1, 15, 16, 26			
				RDP				
Sorghum	Optimum	area	ha	UNFCCC, LULUCF,	5, 6, 7, 8, 9, 10.1,	Farm	Annual	FSS
	1			ND, NECD, FDSUP,	10.2, 11.1, 15, 16, 26			
				RDP	, , , ,			

Triticale	Optimum	area	ha	UNFCCC, LULUCF,	5, 6, 7, 8, 9, 10.1,	Farm	Annual	FSS
				ND, NECD, FDSUP,	10.2, 11.1, 15, 16, 26			
Rice	Optimum	area	ha	UNFCCC, LULUCF,	5, 6, 7, 8, 9, 10.1,	Farm	Annual	FSS
	1			ND, NECD, FDSUP,	10.2, 11.1, 15, 16, 26			
				RDP				
Other	Optimum	area	ha	UNFCCC, LULUCF,	5, 6, 7, 8, 9, 10.1,	Farm	Annual	FSS
cereals				ND, NECD, FDSUP,	10.2, 11.1, 15, 16, 26			
- D			,	RDP	5 (5 0 0 40 4	ъ	, ,	DO0
Peas	Optimum	area	ha	UNFCCC, LULUCF,	5, 6, 7, 8, 9, 10.1,	Farm	Annual	FSS
				ND, NECD, FDSUP, RDP	10.2, 11.1, 15, 16, 26			
Beans	Optimum	area	ha	UNFCCC, LULUCF,	5, 6, 7, 8, 9, 10.1,	Farm	Annual	FSS
Dearis	Оринин	arca	lia lia	ND, NECD, FDSUP,	10.2, 11.1, 15, 16, 26	1 aiiii	7 Hillian	1 55
				RDP	10.2, 1111, 10, 10, 20			
Potatoes	Optimum	area	ha	UNFCCC, LULUCF,	5, 6, 7, 8, 9, 10.1,	Farm	Annual	FSS
	1			ND, NECD, FDSUP,	10.2, 11.1, 15, 16, 26			
				RDP				
Sugar beet	Optimum	area	ha	UNFCCC, LULUCF,	5, 6, 7, 8, 9, 10.1,	Farm	Annual	FSS
				ND, NECD, FDSUP,	10.2, 11.1, 15, 16, 26			
D 11	o :		1	RDP	5 6 7 0 0 404	Б		DOG
Fodder	Optimum	area	ha	UNFCCC, LULUCF,	5, 6, 7, 8, 9, 10.1,	Farm	Annual	FSS
beet				ND, NECD, FDSUP, RDP	10.2, 11.1, 15, 16, 26			
Other root	Optimum	area	ha	UNFCCC, LULUCF,	5, 6, 7, 8, 9, 10.1,	Farm	Annual	FSS
crops	Оринин	area	iia	ND, NECD, FDSUP,	10.2, 11.1, 15, 16, 26	1 aiiii	7 Hillian	100
o-sps				RDP				
Rape	Optimum	area	ha	UNFCCC, LULUCF,	5, 6, 7, 8, 9, 10.1,	Farm	Annual	FSS
				ND, NECD, FDSUP,	10.2, 11.1, 15, 16, 26			
				RDP				

Sunflower seed	Optimum	area	ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	FSS
Soya bean	Optimum	area	ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	FSS
Other oil seeds	Optimum	area	ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	FSS
Industrial crops (flax, hemp, cotton, tobacco, hops)	Optimum	area	ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	FSS
Officinal herbs, aromatic plants	Optimum	area	ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	FSS
Silage maize	Optimum	area	ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	FSS
Clover and mixtures	Optimum	area	ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	FSS
Lucerne	Optimum	area	ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	FSS
Temporary grassland	Optimum	area	ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	FSS

Permanent grassland	Optimum	area	ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	FSS
Common pasture, heathland, rough	Optimum	area	ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	FSS
grazing Fruit trees	Optimum	area	ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	FSS
Olives	Optimum	area	ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	FSS
Vineyards	Optimum	area	ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	FSS
Other permanent crops	Optimum	area	ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	FSS
Wheat	Optimum	harvested yield	kg product per ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	MARS, FADN, crop yield surveys
Rye	Optimum	harvested yield	kg product per ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	MARS, FADN, crop yield surveys

Barley	Optimum	harvested yield	kg product per ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	MARS, FADN, crop yield surveys
Spring barley	Optimum	harvested yield	kg product per ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	MARS, FADN, crop yield surveys
Oats	Optimum	harvested yield	kg product per ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	MARS, FADN, crop yield surveys
Grain maize	Optimum	harvested yield	kg product per ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	MARS, FADN, crop yield surveys
Sorghum	Optimum	harvested yield	kg product per ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	MARS, FADN, crop yield surveys
Triticale	Optimum	harvested yield	kg product per ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	MARS, FADN, crop yield surveys
Rice	Optimum	harvested yield	kg product per ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	MARS, FADN, crop yield surveys
Other cereals	Optimum	harvested yield	kg product per ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	MARS, FADN, crop yield surveys

Peas	Optimum	harvested yield	kg product per ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	MARS, FADN, crop yield surveys
Beans	Optimum	harvested yield	kg product per ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	MARS, FADN, crop yield surveys
Potatoes	Optimum	harvested yield	kg product per ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	MARS, FADN, crop yield surveys
Sugar beet	Optimum	harvested yield	kg product per ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	MARS, FADN, crop yield surveys
Fodder beet	Optimum	harvested yield	kg product per ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	MARS, FADN, crop yield surveys
Other root crops	Optimum	harvested yield	kg product per ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	MARS, FADN, crop yield surveys
Rape	Optimum	harvested yield	kg product per ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	MARS, FADN, crop yield surveys
Sunflower seed	Optimum	harvested yield	kg product per ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	MARS, FADN, crop yield surveys

Soya bean	Optimum	harvested yield	kg product per ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	MARS, FADN, crop yield surveys
Other oil seeds	Optimum	harvested yield	kg product per ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	MARS, FADN, crop yield surveys
Industrial crops (flax, hemp, cotton, tobacco, hops)	Optimum	harvested yield	kg product per ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	MARS, FADN, crop yield surveys
Officinal herbs, aromatic plants	Optimum	harvested yield	kg product per ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	MARS, FADN, crop yield surveys
Silage maize	Optimum	harvested yield	kg product per ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	MARS, FADN, crop yield surveys
Clover and mixtures	Optimum	harvested yield	kg product per ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	MARS, FADN, crop yield surveys
Lucerne	Optimum	harvested yield	kg product per ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	MARS, FADN, crop yield surveys

Temporary grassland	Optimum	harvested yield	kg product per ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	Estimated on the basis of approved Protocol
Permanent grassland	Optimum	harvested yield	kg product per ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	Estimated on the basis of approved Protocol
Common pasture, heathland, rough grazings	Optimum	harvested yield	kg product per ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	Estimated on the basis of approved Protocol
Fruit trees	Optimum	harvested yield	kg product per ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	MARS, FADN, crop yield surveys
Olives	Optimum	harvested yield	kg product per ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	MARS, FADN, crop yield surveys
Vineyards	Optimum	harvested yield	kg product per ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	MARS, FADN, crop yield surveys
Other permanent crops	Optimum	harvested yield	kg product per ha	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Farm	Annual	MARS, FADN, crop yield surveys

Table A4.6. Recommendations for collection of <u>coefficients related to N and P in harvested crop products.</u>

Two scenarios are included. The minimum scenario is the scenario with collection of data which are at least needed for reporting for policies and AEI (e.g. Tier 1) and the optimum scenario is the scenario for collection of data in detailed approaches (e.g. Tier 2 and 3 methods).

Type of	Scenario	Data	Unit	Policy need	AEI need	Scale of c	ollection	Source/method
Data		specification						
Crop type						Spatial	Temporal	
Wheat	Optimum	N content	kg N per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Rye	Optimum	N content	kg N per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Barley	Optimum	N content	kg N per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Spring barley	Optimum	N content	kg N per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Oats	Optimum	N content	kg N per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Grain maize	Optimum	N content	kg N per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study

Sorghum	Optimum	N content	kg N per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Triticale	Optimum	N content	kg N per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Rice	Optimum	N content	kg N per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Other cereals	Optimum	N content	kg N per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Peas	Optimum	N content	kg N per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Beans	Optimum	N content	kg N per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Potatoes	Optimum	N content	kg N per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Sugar beet	Optimum	N content	kg N per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study

Fodder beet	Optimum	N content	kg N per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Other root crops	Optimum	N content	kg N per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Rape	Optimum	N content	kg N per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Sunflower seed	Optimum	N content	kg N per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Soya bean	Optimum	N content	kg N per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Other oil seeds	Optimum	N content	kg N per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Industrial crops (flax, hemp, cotton, tobacco, hops)	Optimum	N content	kg N per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study

Officinal herbs, aromatic plants	Optimum	N content	kg N per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Silage maize	Optimum	N content	kg N per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Clover and mixtures	Optimum	N content	kg N per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Lucerne	Optimum	N content	kg N per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Temporary grassland	Optimum	N content	kg N per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Regional	1x 5 yr	Results desk study
Permanent grassland	Optimum	N content	kg N per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Regional	1x 5 yr	Results desk study
Common pasture, heathland, rough grazing	Optimum	N content	kg N per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Regional	1x 5 yr	Results desk study

Fruit trees	Optimum	N content	kg N per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Olives	Optimum	N content	kg N per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Vineyards	Optimum	N content	kg N per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Other permanent crops	Optimum	N content	kg N per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Wheat	Optimum	P content	kg P per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Rye	Optimum	P content	kg P per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Barley	Optimum	P content	kg P per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Spring barley	Optimum	P content	kg P per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study

Oats	Optimum	P content	kg P per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Grain maize	Optimum	P content	kg P per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Sorghum	Optimum	P content	kg P per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Triticale	Optimum	P content	kg P per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Rice	Optimum	P content	kg P per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Other cereals	Optimum	P content	kg P per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Peas	Optimum	P content	kg P per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Beans	Optimum	P content	kg P per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study

Potatoes	Optimum	P content	kg P per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Sugar beet	Optimum	P content	kg P per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Fodder beet	Optimum	P content	kg P per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Other root crops	Optimum	P content	kg P per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Rape	Optimum	P content	kg P per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Sunflower seed	Optimum	P content	kg P per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Soya bean	Optimum	P content	kg P per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Other oil seeds	Optimum	P content	kg P per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study

Industrial crops (flax, hemp, cotton, tobacco, hops)	Optimum	P content	kg P per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Officinal herbs, aromatic plants	Optimum	P content	kg P per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Silage maize	Optimum	P content	kg P per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Clover and mixtures	Optimum	P content	kg P per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Lucerne	Optimum	P content	kg P per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Temporary grassland	Optimum	P content	kg P per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Regional	1x 5 yr	Results desk study
Permanent grassland	Optimum	P content	kg P per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Regional	1x 5 yr	Results desk study

Common pasture, heathland, rough grazing	Optimum	P content	kg P per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	Regional	1x 5 yr	Results desk study
Fruit trees	Optimum	P content	kg P per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Olives	Optimum	P content	kg P per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Vineyards	Optimum	P content	kg P per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study
Other permanent crops	Optimum	P content	kg P per kg harvested product	UNFCCC, LULUCF, ND, NECD, FDSUP, RDP	5, 6, 7, 8, 9, 10.1, 10.2, 11.1, 15, 16, 26	EU	1 x 5 yr	Results desk study