

Nitrogen balance from dairy farms (2002)

Denmark, 2002

The Danish aquatic environment plan focuses on reducing nitrogen discharge to the aquatic environment. Farming is one of the major contributors to this discharge, which is why it is useful to have an overview of the nitrogen balance and emissions in Danish farming. The data presented here refers to the Nitrogen use and losses in different types of Danish dairy farms in 2002. The different farm types are set according to soil type and major enterprise and they can be seen [here](#). For process description, data collection and treatment etc. please look at the processes for each farm type ([Here](#)). For more details on the Nitrogen balance method see [here](#).

The Nitrogen balance data is presented in three tables:

[Table 1](#). Characteristics of area, land use and production levels of full time mixed dairy farms in Denmark year 2002

[Table 2](#). Farm gate N-turnover and -loss at mixed dairy farms in Denmark year 2002

[Table 3](#). Field level N-turnover at mixed dairy farms in Denmark year 2002

Table 1. Characteristics of area, land use and production levels of full time mixed dairy farms in Denmark year 2002 (average by farm type)

Soil type ¹⁾	Sandy loam				Sand				
	<1.4	1.4-2.3	>2.3	Org.	<1.4	1.4-2.3	>2.3	Org.	Suckler
Farmtype [LSU ²⁾ ha ⁻¹]									
Representativity									
Number of farms in data set	21	29	11	14	93	212	13	133	109
Area represented by farm type [1000ha]	31	35	9	5	166	260	11	65	227
% of Danish milk Production	3	7	2	1	17	47	3	8	0
Herd data									
Dairy per farm [cows farm ⁻¹]	45	70	83	78	59	79	94	90	0
LSU per farm [LSU farm ⁻¹]	74	109	122	119	96	124	152	138	23
Stocking rate [LSU ha ⁻¹]	0.9	1.7	2.4	1.2	1.0	1.7	2.6	1.2	0.6
Feed uptake, 100 SFU LSU ⁻¹ y ⁻¹	49	50	47	45	49	49	47	45	40
N uptake, kg N LSU ⁻¹ y ⁻¹	144	147	135	131	144	144	139	132	137
N-efficiency, herd ³⁾	22.3%	20.4%	19.7%	20.3%	20.3%	20.0%	20.6%	19.8%	16.0%
Area									
Total farm area [ha farm ⁻¹]	81	63	50	102	96	74	58	117	39
Crop rotation [% of farm area]									
Permanent grass	8	6	6	9	11	10	8	11	21
Set-aside	7	6	6	0	7	6	9	0	6
Cereal for harvest	47	29	26	23	38	16	8	15	47
Maize/whole crop silage	15	32	44	27	19	39	61	26	4
Grass/clover in rotation	15	22	9	40	21	26	13	47	15
Production									
Cereal yield [100kg ha ⁻¹]	58	61	58	38	49	50	41	41	46
Milk yield [kg ECM cow ⁻¹ yr ⁻¹]	7861	7911	7174	6908	7764	7764	7581	6958	0

1) Sandy loam > 5% clay, Sand < 5% clay

2) Livestock units (LSU), DK definition: 1 LSU = 100 kg total N in manure ex. storage, 0.85 LSU=1 dairy cow on 8,500 l milk year⁻¹

3) N-efficiency = output of animals and livestock products/input of feed

Table 2. Farm gate N-turnover and -loss at mixed dairy farms in Denmark year 2002 (kg N ha⁻¹ year⁻¹)

Soil type	Sandy loam				Sand				
	<1.4	1.4-2.3	>2.3	Org.	<1.4	1.4-2.3	>2.3	Org.	Suckler
Farm type (LSU ha ⁻¹)									
Inputs									
Mineral fertiliser	79	59	30	0	76	61	43	0	94
Organic fert. & live stock ¹⁾	5	2	-26	7	12	1	-51	8	16
Supplement feed	45	137	226	33	42	109	241	25	13
Straw for bedding ¹⁾	0	9	16	7	2	9	17	6	0
Biological N-fixation	21	26	14	72	25	33	24	77	20
Deposition and precipitation	16	16	16	16	16	16	16	16	16
Total input	166	249	276	135	173	229	290	132	159
Outputs									
Milk	-22	-47	-62	-26	-25	-43	-65	-26	0
Meat	-9	-11	-10	-5	-7	-9	-16	-5	-16
Cash crops	-26	-11	-6	-3	-13	-3	0	-2	-26
Total output	-57	-69	-78	-35	-45	-55	-81	-33	-42
Farm gate N-balance	109	180	198	100	128	174	209	99	116
N loss, stable and storage ²⁾	-13	-26	-33	-14	-13	-22	-36	-14	-8
Field N balance	97	155	165	86	115	152	174	85	109
Field N-efficiency ³⁾	55%	47%	41%	60%	51%	48%	42%	61%	48%
N loss, field									
Fertilisation, manure spreading ²⁾	-12	-21	-24	-12	-14	-20	-23	-12	-10
Crops ²⁾	-4	-4	-4	-2	-4	-4	-4	-2	-3
Denitrification ²⁾	-32	-35	-37	-34	-11	-14	-15	-11	-9
Soil-N change	7	24	19	15	25	39	39	36	12
Leaching ⁴⁾	-41	-70	-81	-22	-61	-75	-92	-24	-75

1) Net import = import-export of manure, straw and living animals

2) Calculated standard ammonia emission and denitrification

3) N-efficiency = 100*output/input

4) Leaching = field N balance - N aerial loss (fertilization + crops + denitrification) +/- soil-N changes

Table 3. Field level N-turnover at mixed dairy farms in Denmark year 2002 (kg N ha⁻¹ year⁻¹)

Soil type	Sandy loam				Sand				
	<1.4	1.4-2.3	>2.3	Org.	<1.4	1.4-2.3	>2.3	Org.	Sucler
Farm type (LSU ha ⁻¹)									
Inputs									
Mineral fertiliser	79	59	30	0	76	61	43	0	94
Imported organic fertiliser	4	0	0	18	11	0	0	21	13
Manure from own herd ¹⁾	96	193	220	107	108	182	217	105	67
Biological N-fixation	21	26	14	72	25	33	24	77	20
Deposition and precipitation	16	16	16	16	16	16	16	16	16
Total input	216	294	280	213	236	292	300	219	209
Outputs									
Cash crops	-3	-2	-1	0	-1	0	0	0	-2
Grain	-22	-9	-5	-3	-12	-2	0	-1	-25
Grain for feed ²⁾	-21	-19	-18	-11	-18	-10	-5	-8	-11
Straw harvested	-7	-7	-5	-3	-7	-4	-2	-2	-5
Straw mulched ³⁾ (Not in output)	-2	0	0	0	0	2	0	0	-2
Roughage for feed ²⁾	-66	-102	-86	-110	-83	-124	-119	-123	-58
Total output	-199	-139	-115	-127	-121	-140	-126	-134	-101
Field N balance	97	155	165	86	115	152	174	85	109
Field N-efficiency ⁴⁾	55%	47%	41%	60%	51%	48%	42%	61%	48%

1) After deduction of ammonia loss in stables, storage and sold manure, see farm gate balance

2) Feed used in own herd

3) Straw left on field, not included in balance but used in soil-N modeling

4) N-efficiency = 100*output/input

Administrative information

Data URL: http://www.lcafood.dk/processes/agriculture/N_balance_dairyfarms.html

Version no.: 1.00

Author: Ib Sillebak Kristensen, [Danish Institute of Agricultural Science](#).

Data responsible: Ib Sillebak Kristensen, DIAS

Contact:

Data entry: Transformed into this format by Rikke Frederiksen, DIAS

Data completed: HTML format: November 2004.