Fertilizer accounts in Denmark

Ministry of Food, Agriculture
and Fisheries of Denmark

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Agenda

- Danish Agriculture in numbers
- Fertilizer accounts and mandatory fertilizer plans
- Control of fertilizer accounts
- One system of submitting - GHI
- Nitrogen application standards

Danish Agriculture in numbers

National territory	4.3 million hectares
Agricultural area	2.6 million hectares (6 % permanent grass)
Number of agricultural holdings	43,000 holdings
Number of livestock holdings	24,000 holdings
Annual production of pigs for slaughter	20 million
Number of dairy cattle	500,000

Fertilizer accounts and mandatory fertilizer plans

Fertilizer accounts and plans were initially implemented by the Act on Agriculture Use of Fertilizers and Plant Cover in 1992.

The Act also regulate agricultural use of fertilizers and the requirements for plant cover and other crop related measures to reduce nitrogen leaching.

In the Act there are minimum thresholds for when the farmer should be registered and fulfill the requirements.

Fertilizer accounts and mandatory fertilizer plans I

Farmers who are covered by the rules relating to fertilizer must enter the Register for Fertilizer Account.

Farmers must register if they have an annual turnover of more than 50,000 DKK (6,600 EUR) relating to agricultural activity, and at least one of these conditions:

- Has more than 10 livestock units
- Has more than 1.0 livestock unit per hectare
- Receives more than 25 tonnes of livestock manure

Fertilizer accounts and mandatory fertilizer plans II

Farmers registered in the Register for Fertilizer Accounts are required to:

- prepare a fertilizer plan and to keep it for 5 years
- calculate the nitrogen-quota for the farm
- submit a fertilizer account through GHI-system

Fertilizer accounts and mandatory fertilizer plans III

Farmers who are registered in the Register for Fertilizer Accounts are allowed to buy chemical fertilizer without paying tax on fertilizer (0,66 EUR per kilo of nitrogen).

Farmers with an annual turnover between 20,000 DKK (2,600 EUR) and 50,000 DKK (6,600 EUR) may voluntary enter the Register for Fertilizer Accounts.

Fertilizer plan

The fertilizer plan must be prepared before the growth season begins.

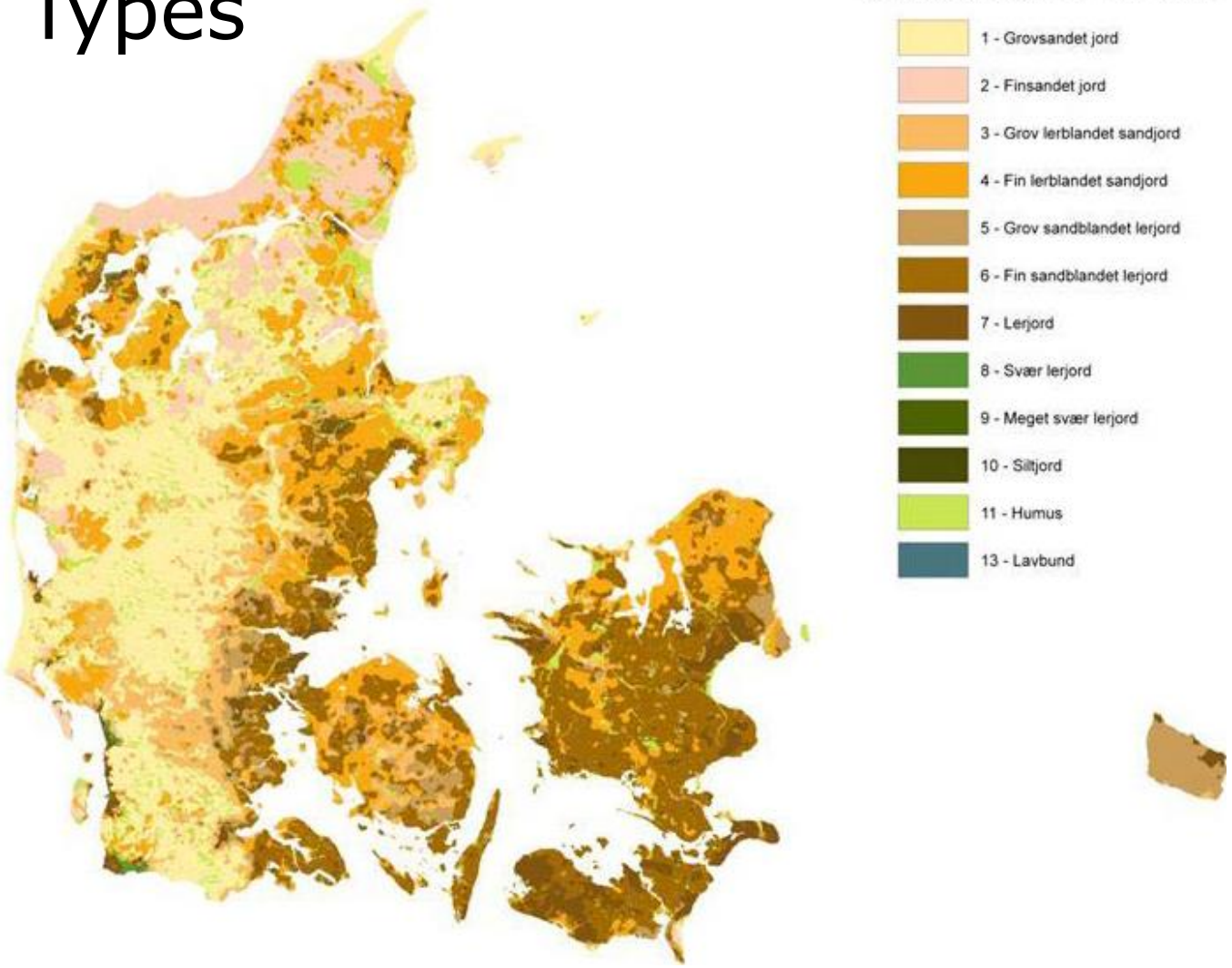
It contains information about the farms field plan including information about:

- Size of area
- Soil type
- Previous crop
- Planned crop
- The nitrogen standard of the crop
- The corrected standard (depending on previous crop etc.)

Field map

Ministry of Food, Agriculture and Fisheries of Denmark

Soil Types


Jordbund, A-horisont
1 - Grovsandet jord
2 - Finsandet jord
3 - Grov lerblandet sandjord
4 - Fin lerblandet sandjord
5 - Grov sandblandet lerjord
6 - Fin sandblandet lerjord
7 - Lerjord
8 - Svær lerjord
9 - Meget svær lerjord
10 - Siltjord
11 - Humus
13 - Lavbund

Fertilizer accounts I

The fertilizer account must be submitted after the growth season is over.

The fertilizer account contains information about:

- Area sizes and type of crops
- The nitrogen standard for the crops
- The calculated nitrogen quota for the farm
- Number of livestock units
- Type of livestock and the nitrogen from the livestock production
- Use of fertilizers – both livestock manure and chemical fertilizer
- Delivery of chemical fertilizer
- Exchange of fertilizer or manure
- Manure and fertilizer stock

Fertilizer accounts II

Area sizes
The area size of the farm is the sum of the cultivated, uncultivated and set-aside areas

The nitrogen standard for the crops
All crops are given a nitrogen standard. Uncultivated and set-aside areas also have nitrogen standards, however the nitrogen standard may be zero

The calculated nitrogen quota for the farm
The nitrogen quota of the farm is the sum of the nitrogen quota of each field. The field nitrogen quota is calculated on basis of the size and the nitrogen standard.
The nitrogen quota of the farm provides the amount of fertilizer (manure and chemical fertilizer) that can be applied on the farm

Example - nitrogen quota

Markplan med gødningsoplysninger

1	2	3	4	5	6	7	8	9		10		11		12
Mark-nummer	Markblok-nummer	Areal	Fradrags-arealer	Jordbundstype (JB)		Harmoni areal	Vanding	Hovedafgrøde		Forfrugt		Efterafgrøde og udlæg		
		ha	ha	Standard	Ændret			kode	beskrivelse	kode	beskrivelse	kode	beskrivelse	areal ha
1	696198-66	5,82	0,14		4	☑	☐	14	Vinterrug	260	Græs med kløver/lucerne, under 50 % bælgpl. (omdrift)			
2	696199-62	5,60	0,00		4	☑	☐	260	Græs med kløver/lucerne, under 50 % bælgpl. (omdrift)	260	Græs med kløver/lucerne, under 50 % bælgpl. (omdrift)			
3	696198-66	5,80	0,00		4	☑	☐	260	Græs med kløver/lucerne, under 50 % bælgpl. (omdrift)	2	Vårhvede			
4	696198-66	5,92	0,09		4	☑	☐	14	Vinterrug	14	Vinterrug			
6	696198-66	1,09	0,00		4	☑	☐	260	Græs med kløver/lucerne, under 50 % bælgpl. (omdrift)	2	Vårhvede			
7	696199-62	0,92	0,00		4	☑	☐	1	Vårbyg	14	Vinterrug	965	Kløvergræs, udlægleftersl æt efter korn o.l.	0,92
8	696198-66	0,37	0,00		4	☑	☐	252	Permanent græs, normalt udbytte	252	Permanent græs, normalt udbytte			
9	696199-62	0,43	0,00		4	☑	☐	260	Græs med kløver/lucerne, under 50 % bælgpl. (omdrift)	260	Græs med kløver/lucerne, under 50 % bælgpl. (omdrift)			
10	696199-62	0,20	0,00		11	☑	☐	250	Permanent græs, meget lavt udbytte	250	Permanent græs, meget lavt udbytte			
Antal marker 9		26,15	0,23			25,92	0,00							

Example - nitrogen quota

Markplan med gødningsoplysninger, fortsat...

13	14	15	16	17	18	19	20	21	22	23
Mark-nummer	N-fradrag forfrugt	N-norm afgrøde	N-norm udlæg	N-korrektion	Korrektion for kvælstof-prognose	N-kvote i alt pr. ha	N-kvote i alt pr. mark	P-norm afgrøde	P-norm efter-afgrøde	P-behov i alt
	kg N pr. ha	kg N pr. ha	kg N pr. ha	kg N pr. ha	kg N pr. ha	kg N pr. ha	kg N pr. mark	kg P pr. ha	kg P pr. ha	kg P pr. mark
1	84	120	0		5	41,00	232,88	18	0	102,24
2	0	230	0		0	230,00	1.288,00	32	0	179,20
3	0	230	0		0	230,00	1.334,00	32	0	185,60
4	0	120	0		5	125,00	728,75	18	0	104,94
6	0	230	0		0	230,00	250,70	32	0	34,88
7	0	110	31		5	146,00	134,32	21	6	24,84
8	0	127	0		0	127,00	46,99	13	0	4,81
9	0	230	0		0	230,00	98,90	32	0	13,76
10	0	25	0		0	25,00	5,00	3	0	0,60
Total Sum:							4.119,54			650,87

Fertilizer accounts III

Livestock units

The fertilizer accounts must include information on animal type and number, and the type of housing, feedstuffs, production etc. so that the amount of nitrogen in the manure produced can be calculated.

Use of fertilizers – <u>both</u> livestock manure an chemical fertilizer

The fertilizer accounts contain information on use of fertilizer - both livestock manure and chemical fertilizer. There are requirements for utilization of nitrogen in livestock manure.

High efficiency on animal manure N

Type of manure	Efficiency
Pig slurry	75%
Cattle slurry	70%
Mink and poultry slurry	70%
Liquid manure	65%
Deep litter	45%

Fertilizer accounts IIII

Delivery of commercial fertilizer
Farmers must report supplied fertilizer.
All suppliers must report to the Register of Suppliers the amount and fertilizer types sold.

Exchange of fertilizer or manure
Farmers can exchange fertilizer to other farmers who are in the Register for Fertilizer Accounts. The exchange must be documented by a signed agreement.

Manure and fertilizer stock
Opening and closing stock for the growing season should be calculated
annually.

Control I

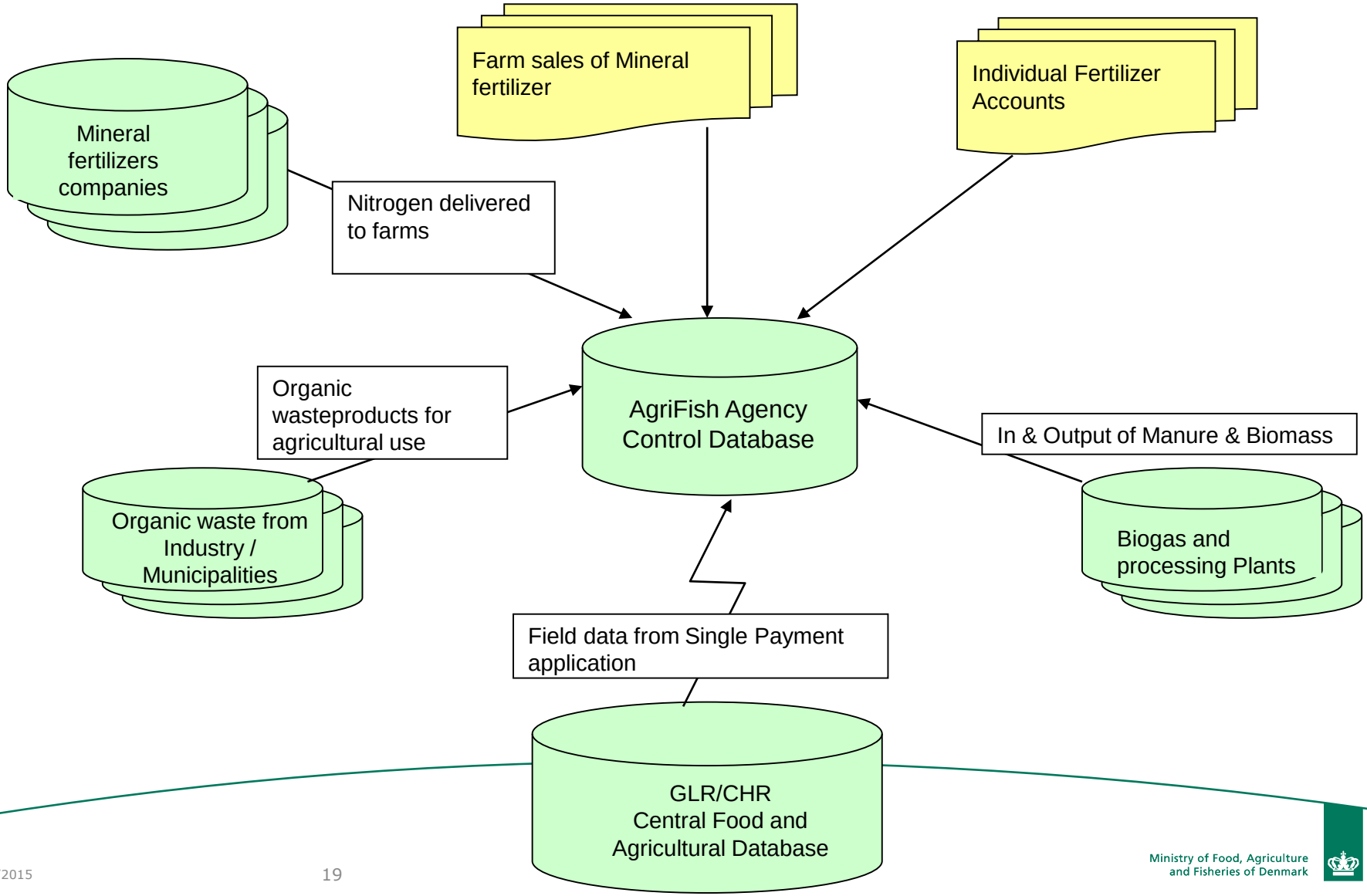
The Danish AgriFish Agency controls the regulation on limitation of the land use of fertilizers.

Every year about 1% of the farmers get a visit from the control department. In addition to this, an administrative control is run on about 4 % of the farmers that submit a fertilizer account.

The criteria for selection of the farmers are evaluated each year and a motivation for new criteria is described (risk based).

The control departments are located in 5 districts.

Data overview



Cross compliance I

Requirement no. 1.17 Farmers within The Register of Fertilizer Accounts shall prepare and submit their fertilizer account after every growth season before the 31th of March.

Requirement no. 1.18 Farmers can deduct the nitrogen in manure if the manure is allocated to another registered farmer, biogas facilities, processing plants or to a foreign country.

Requirement no. 1.19 Farmers consumption of nitrogen cannot exceed its quota for nitrogen.

Requirement no. 1.21 Farmers must establish catch crops after normal operating principles for an effective nitrogen uptake in the autumn.

Requirement no. 1.22 Limits on allocation of manure (harmony rules).

Nitrogen application standards I

Every year the 1st of August the nitrogen standards for every crop are published by the Danish Plant Directorate in “The Guidelines on Fertilization and Harmony Rules”.

The nitrogen standards are used for calculating the total amount of manure and commercial fertilizer which are permitted to use on the farm in the upcoming growing period.

Crop	Coarse sand no irrigation JB 1+3		Sand no irrigation JB 2+4 og 11+12[1]		Sand irrigation JB 1-4		Clay soil JB 5-10		Corr.. yield.	indicative norms for phosphor and potassium	
	yield-norm hkg/ha	nitrogen-norm kg N/ha	yield-Norm hkg/ha	nitrogen-norm kg N/ha	yield-norm hkg/ha	nitrogen-norm kg N/ha	yield-norm hkg/ha	nitrogen-norm kg N/ha	kg N/ hkg	kg P/ha	kg K/ha
1	2	3	4	5	6	7	8	9	10	11	12
Spring-sown crops:											
Barley after minimum 2. years of corn	41	122	48	**117**	53	138	59	123	1,5	20	60
Barley after 1. y. corn, fallow and seed-grass	41	117	48	113	53	133	59	119	1,5	20	60
Barley after beets	41	104	48	99	53	120	59	106	1,5	20	60
Barley after clover grass and lucerne	41	59	48	55	53	75	59	61	1,5	20	60
Barley after potatoes	41	113	48	108	53	129	59	115	1,5	20	60
Barley after other precrops	41	99	48	95	53	115	59	101	1,5	20	60
Oat	41	90	48	86	53	106	59	92	1,5	20	60

Nitrogen standards

Table showing cropspecific nitrogen quota per hectare

Crop	Coarse sand no irrigation JB 1+3		Sand no irrigation JB 2+4 og 11+12[1]		Sand irrigation JB 1-4		Clay soil JB 5-10		Corr.. yield.	indicative norms for phosphor and potassium	
	yield-norm hkg/ha	nitrogen-norm kg N/ha	yield-norm hkg/ha	nitrogen-norm kg N/ha	yield-norm hkg/ha	nitrogen-norm kg N/ha	yield-norm hkg/ha	nitrogen-norm kg N/ha	kg N/ hkg	kg P/ha	kg K/ha
1	2	3	4	5	6	7	8	9	10	11	12
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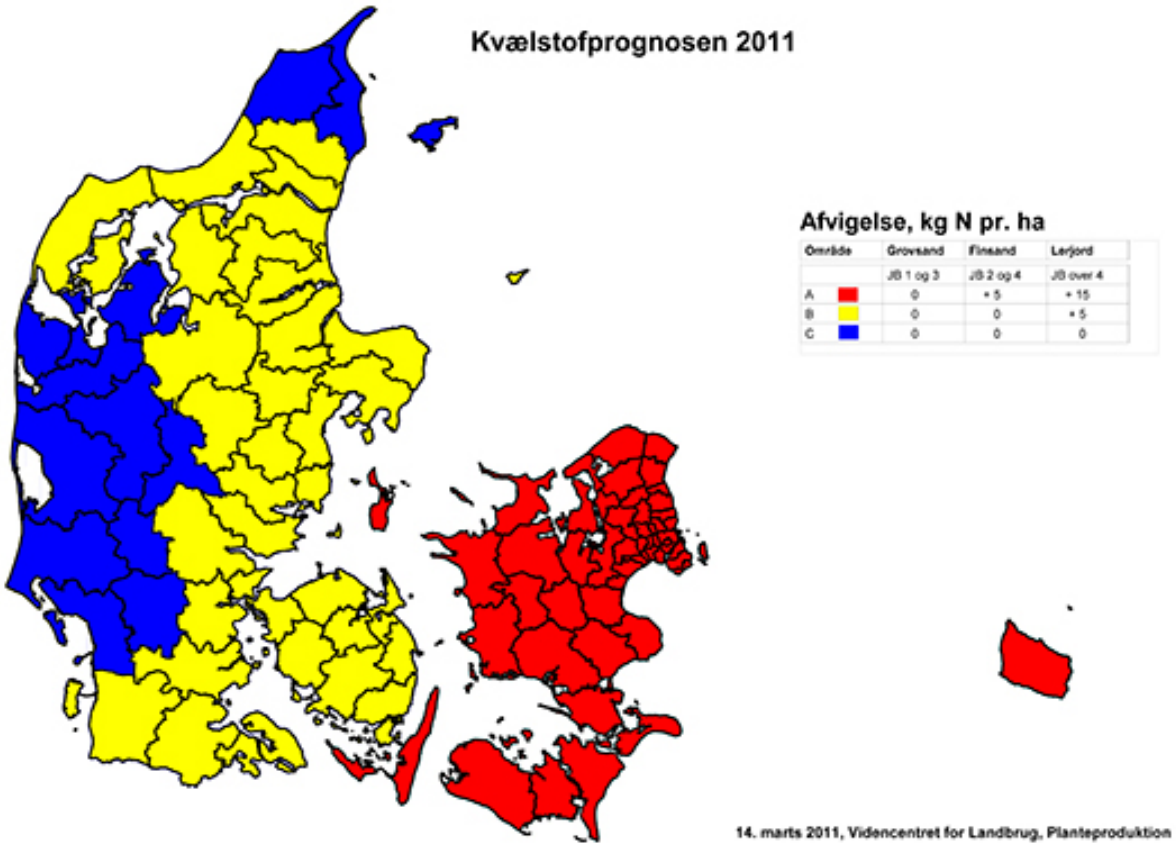
Barley after beets	41	104	48	99	53	120	59	106	1,5	20	60
Barley after clover grass and lucerne	41	59	48	55	53	75	59	61	1,5	20	60
Barley after potatoes	41	113	48	108	53	129	59	115	1,5	20	60
Barley after other precrops	41	99	48	95	53	115	59	101	1,5	20	60
Oat	41	90	48	86	53	106	59	92	1,5	20	60
Wheat after minimum 2. years of corn	41	128	48	126	53	147	59	133	1,7	20	60
Vårhvede after other precrops	41	115	48	112	53	133	59	120	1,7	20	60
Spring-sown corn, others	41	99	48	95	53	115	59	101	1,5	20	60
Spring –sown crops with a minimum of 50 pct. legumes	31	63	38	52	43	68	49	48	0,5	20	60
Winter crops:											
Wheat after minimum 2. years of corn	52	164	70	172	70	185	87	183	1,3	20	65
Wheat after 1. year corn and fallow	52	151	70	158	70	172	87	169	1,3	20	65
Wheat after winter rape	52	115	70	123	70	136	87	134	1,3	20	65
Wheat after legumes, spring rape or flax	52	124	70	132	70	145	87	143	1,3	20	65

Nitrogen application standards II

In early spring the nitrogen standards are adjusted by the nitrogen forecast. The forecast is based on the precipitation, and how much nitrogen the soils contains in the early winter. The forecast is based on soil types and geographical regions.



Nitrogen application standards III

The standards published in the guideline are set below the economic optimum.

For the growth season 2010/11 the standards were approximately 16% below the economic optimum.

Nitrates Directive
Overview, action plans

1985 NPo Action Plan
1987 Action Plan I on the Aquatic Environment
1991 Action Plan for a Sustainable Agriculture
1998 Action Plan II
2000 AP II Midterm Enforcement
2001 Ammonia Action Plan
2004 Action Plan III
2008 Midterm evaluation AP III
2009 Green Growth Agreement

Action Plan on the Aquatic Environment II (Action Plan II) 1998-2003

- Target: 49% reduction of N-leaching compared to the mid 1980s
- Mandatory catch crops (>10 ha 6% of the area)
- Nitrogen standards norms lowered to 10 % under economic optimal application rate.
- Livestock density demands at 1,7 LU/ha for cattle and 1,4 LU/ha for pigs
- Increased efficiency rates for manure (pig slurry: 60 to 75 %, cattle slurry: 55 to 70 %, deep litter: 25 to 45 %, other types 50 to 65 %)
- Improved animal feeding practice to improve utilization of feed
- Tax on DKK 5 per kg nitrogen in fertilizer (farms are exempted if they register in the manure register – compulsory for most farms, but not possible for nonfarm nitrogen fertilizer users)
- Ban on slurry application by broadcaster spreader (2001)
- Slurry spread on bare soil must be incorporated within 6 hours (2001)
- Forestation, conversion to organic agriculture, reduced nitrogen use in vulnerable areas, and establishment of Wetlands

Action Plan on the Aquatic Environment III (Action Plan III) 2004-2015

Target:

13 % reduction of **nitrogen** leaching in 2015 compared to 2003

50 % reduction of **phosphorous** surplus (2002-2015)

- Mandatory catch crops increased to 10 and 14 %
- 50.000 ha 10 m. buffer zones along streams and lakes before 2015
- For phosphorous encouraged by a tax on mineral phosphorous added to feed.
- Strengthen and increase organic farming
- Establish more wetland and support environmentally sensitive farming.

Green Growth Agreement 2009-2015

- Deals with the problems formerly encountered in achieving expected goals in APAEIII
- BUT is much broader than the APAEs and therefore Denmark now needs a specific Nitrate Action Programme
- The Nitrate Action Programme will describe the parts of the GGA that implement the Nitrate Directive in DK
- Target in APAEIII (2005-2015) reduction in N leaching from the root zone: **21,000 t N**
- Target in GGA (2010-2015) reduction in N discharge to the aquatic environment from 2010 to 2015: **19,000 t N**
- Of which about 9,000 t N (re-calculated) is the APAEIII target

Green Growth Agreement 9,000 t N

- 10 metres' mandatory spraying-free, fertilizer-free and cultivation-free buffer zones along all watercourses and lakes, equivalent to app. 50,000 hectares.
- 140,000 ha more catch crops
- Tightened regulation on existing APAE-catch crops
- Neutralisation of the nitrogen quota when taking agricultural land out of production for purposes as town development, nature, etc.
- Ban on certain forms of soil cultivation in the autumn
- Ban on ploughing grass fields at certain periods of the year (like derogations farms)
- 10,000 ha of wetlands
- Forestation and organic farming

Nitrates Directive in Denmark

1. Whole territory covered by Action Plan
2. 170 kg N/Ha
3. Storage capacity
4. Closed periods
5. Buffer strips
6. Fertilizer account/Mandatory fertilizer plans
7. Nitrogen application standards
8. High efficiency on animal manure N
9. Catch crops

Limit in ND 170 kg N/ha

- Danish harmony rules
- 140 kg N/ha pigs and other livestock (1.4 LU/ha)
- 170 kg N/ha cattle (1.7 LU/ha)
- 230 kg N/ha derogation for cattle (2.3 LU/ha)

Calculated on the basis of the stable:
Stable bed with solid floor

		Nitrogen	Phosphorus	Potassium	Number of livestocks for 1 livestock unit (≈ 100 kg N)	Applied nitrogen pr. hectare
Stable bed with solid floor	**slurry**	**126,6**	**21,6**	**123,6**	**0,75**	**161,4**

Questions ?