Miljøministeriet
Miljøstyrelsen

Ammonia abatement in Denmark

Geneva 2017

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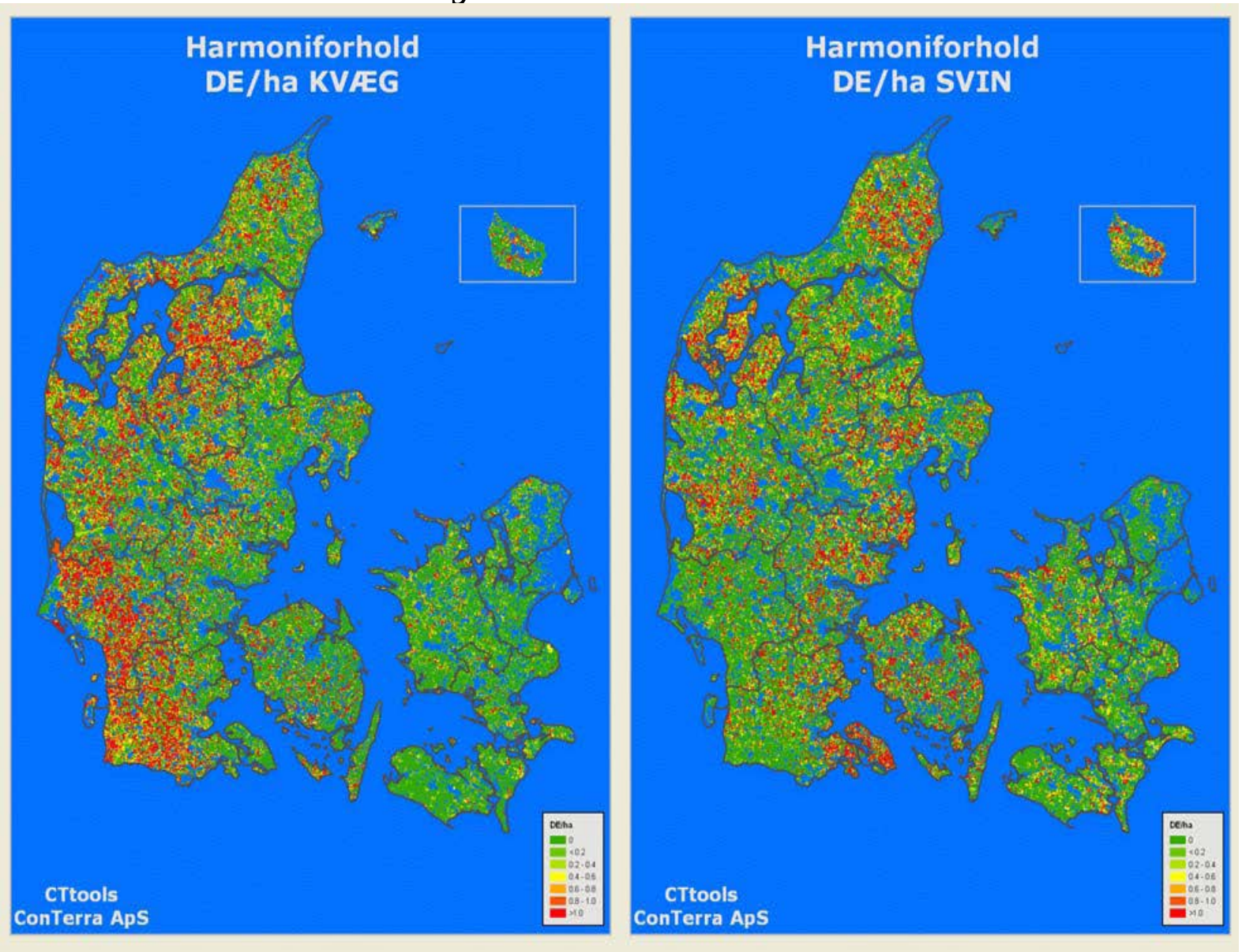
Danish Agriculture

National territory	4.3 mill. hectares
Agricultural area	2.6 mill hectares (6 pct. permanent grass)
Number of agricultural holdings	55.000 holdings
Number of livestock holdings	30.000 holdings
Annual production of pigs for slaughter	23 mill. pigs for slaughter
Annual milk production	4.5 bn. kg milk

Livestock density



Focus for the media and politicians

Before 2001-2003

- Nitrate pollution of the ground water (health)
- Dead fish and lobsters in response to periods of oxygen deficit in fjords and coastal waters (1986 had big incident)

Now - also

- a growing a concern for biodiversity and vulnerable nature
  - More focus on ammonia emission
  - More focus on phosphorous
  - local 'response' to increase in livestock production (nobody like to have a major pig farm as close neighbour)
  - Focus on odour from pigs and slurry
  - health effect of secondary PM-pollution

Overview, Action Plans

1985	NPo Action Plan
1987	Action Plan I on the Aquatic Environment (objective 49 % reduction of nitrate leaching)
1991	Action Plan for Sustainable Agriculture
1998	Action Plan II
2000	AP II Midterm evaluation
2001	Ammonia Action Plan (as set out in Action Plan II)
2004	Action Plan III
2009	Green Growth
2015	Foodstuff and agriculture action plan (growth)

Regulatory measures on use of fertilizers and winter plant cover. Control and inspection by state authorities

- Mandatory fertilizer plans
- Mandatory demands for late crops (grass, beets, catch crops)
- Standards on utilization of animal manure N (70-75 % slurry)
  can result in a reduction in the allowed amount of commercial fertilizer
- Maximum limits for plant-available N applied to different crops
  nitrogen standards which were 18 %, now 0 %, below economic optimum
- Max. 140 kg N/ha from animal manure. Rest from commercial fertilizer.
  170 kg N/ha from cattle holdings - 230 kg N/ha under certain conditions on crops – special exception in Nitrate Directive

Housing - Best Available Technology

- From 2007 a 15 % reduction of NH3 was required compared to ”best standard housing system”
- Gradually increased to 30 % in 2010
- Reduction measures of own choice – incl. feeding, housing, add-on technologies and storage.
- In 2010 the guideline in the 2003 BREF (pigs and poultry) was transformed into national guiding emission limit values for all animal types. From 2017 these limit values are binding.
- Major revision in 2017. Regulation is based on emission per floor area (emitting surface) rather than animal units.

Definition of BAT: single technique < 100 Dkr. (~ €13)/ kg reduced N and a combination of techniques < 1-2 % of cost of production (~ € 5)

Regulatory measures encompassed all livestock production

Demands to animal housing (Floors ect.)

Storage capacity

- 7-9 month – preferably a full year

Cover on storage container, compost and manure yards

Control and inspection by local authorities

Regulation regarding spreading of livestock manure

•Purpose: to reduce ammonia emissions and nitrate leaching

•Periods of spreading: Not allowed to use livestock manure after harvest to 1. February. Exception: allowed in the autumn on grass and winter rapeseed

•only band spreading and injection of slurry is allowed
(no overall / broad spreading)

•It is mandatory to inject slurry used on grass and on “bare soil”

•Solid manure shall be incorporated into the soil within 6 hours when spreading on bare soil

•These measures (2 slides) decreased the Danish ammonia emissions to air by 30% from end of 1990’es to 2003.

Voluntary measures

- 16.000 hectare wetlands
- 170.000 hectare organic farmning mostly dairyfarms

New local actionsplans for the aquatic environment

- 10 meter bufferzones along streams and lakes
  - Introduced 2012
  - Abandoned 2015
- Additionally 140.000 ha late crops
- More wetlands
  - implementation still pending
- Restrictions in soil management in the autumn

Environmental achievements

Nitrate :

- 1985-2003 : Nitrate leaching reduced with 48 % (Chemical fertilizer (N) 49 %)
- Green Growth (2009) : add. 19.000 tons reduction (2015) (WFD) (30 %)

Phophorous :

- 1985-2003 : Surplus reduced with app. 50 % (25 kg P/ha => 13 kg P/ha)
- 2004 (AAE III) : Surplus reduced with 50 % (2015) => 7 kg P/ha

Ammonia :

- 1990-2007 : Reduced with app. 30 %.
- Green Growth (2009) : New standards (30 % reduction compared to best practice 2005/2006) and demands for max. deposition on nature (vulnerable nature compassed by Habitat Directive (0,2-0,7 kg N per hectare)

Whats on its way for animal manure ?

Biogas :

•6 % of the slurry is today treated in biogasplants

•Utilization of N is increased from 75 to 85 % in residue, energy is produced and the methane emission is reduced.

Slurry separation :

•10 % of the slurry is separated and dry matter is exported to other farms.

•Dry matter compressed to pills and exported (high dry matter and P)

•Dry matter could be used for burning (energyproduction)

Acidification:

•Reduced ammonia emission and improved utilization of nitrogen
19 % of total amount is acidified – most from cattle, as acidification can act as a substitution for injection on grasslands

Surveillance of surface water quality