



# Economic analysis of the ammonia regulation with respect to Nature 2000 - Germany, the Netherlands and Denmark

**Associate Prof. Brian H. Jacobsen**

Dept. of Food and Resource Economics (IFRO),  
University of Copenhagen Denmark

Latacz-Lohmann, Uwe., University of Kiel, Germany

Luesink, Harry and Michels, Rolf, Wageningen University and Research,  
The Netherlands

Lisa Ståhl, Department of Food and Resource Economics, University of  
Copenhagen, Denmark

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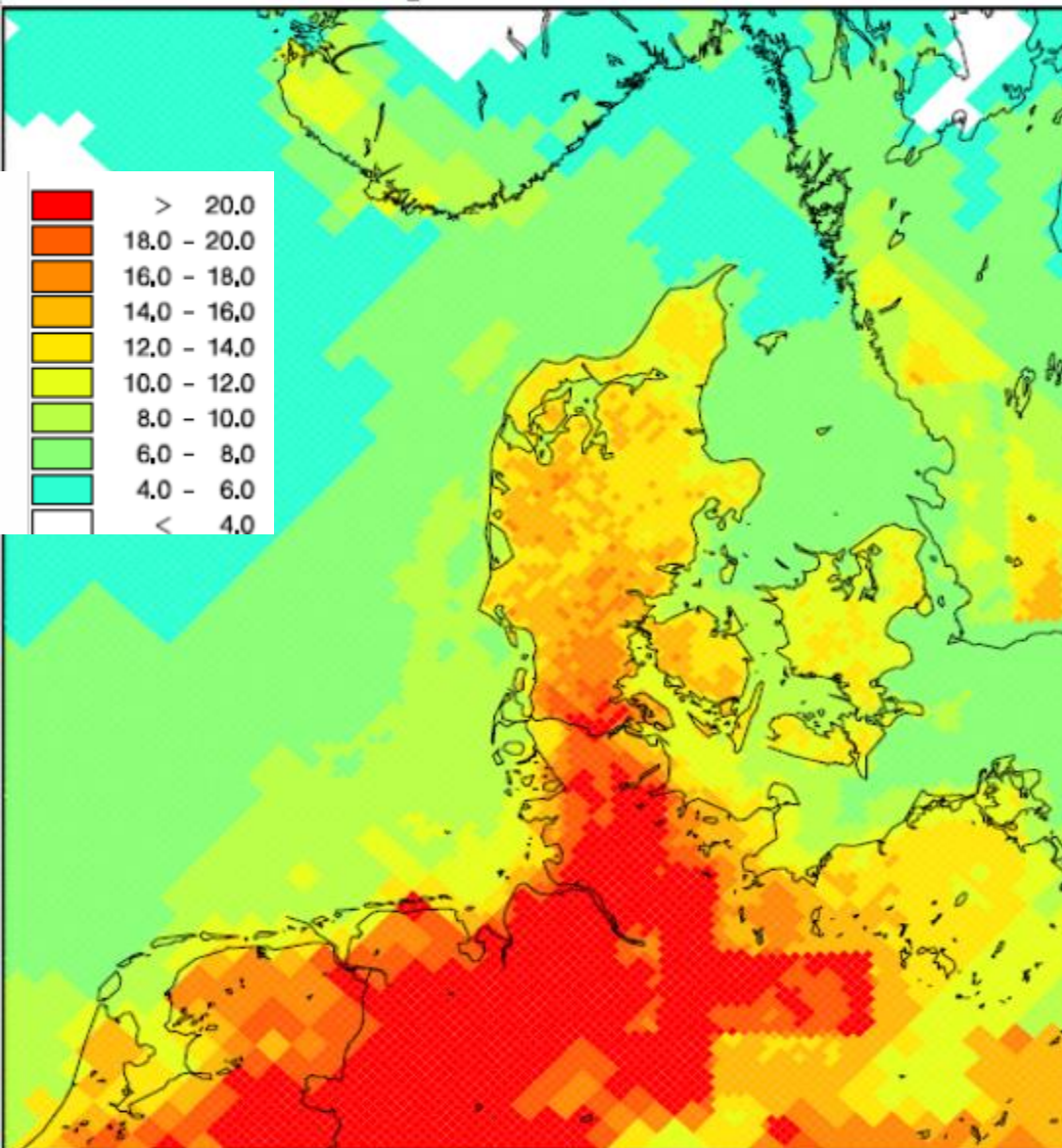
## Content

- Ammonia locally and internationally
- Agricultural production and location of farms
- NEC directive and 2020 targets
- Case farms and reduction requirements  
(400 and 2000 meters from Natura 2000 area)
- Technologies and costs
- Overall remarks



# Why is Ammonia an issue ?

Total deposition for 2016 of totN



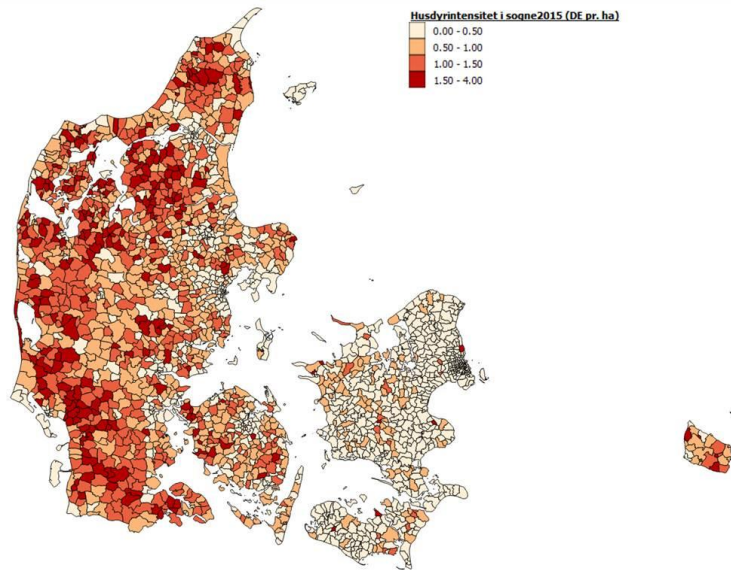
## Ammonia: Health and Nature

“Ammonia contribute to **half the particulate matter exposure** in the Benelux area and it is the **main cause for excess deposition on Nature areas**”

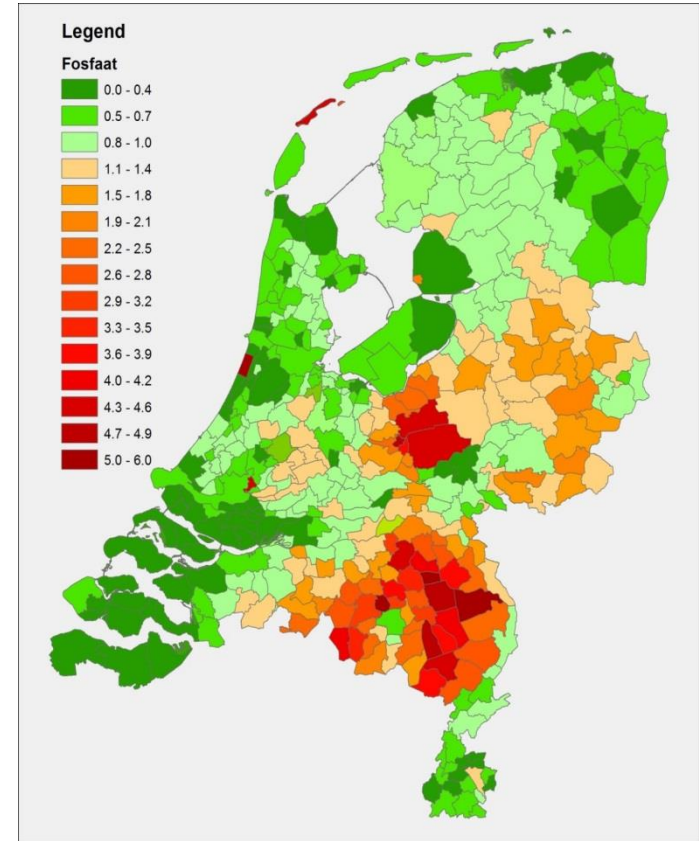
(Benelux working group on clean Air)



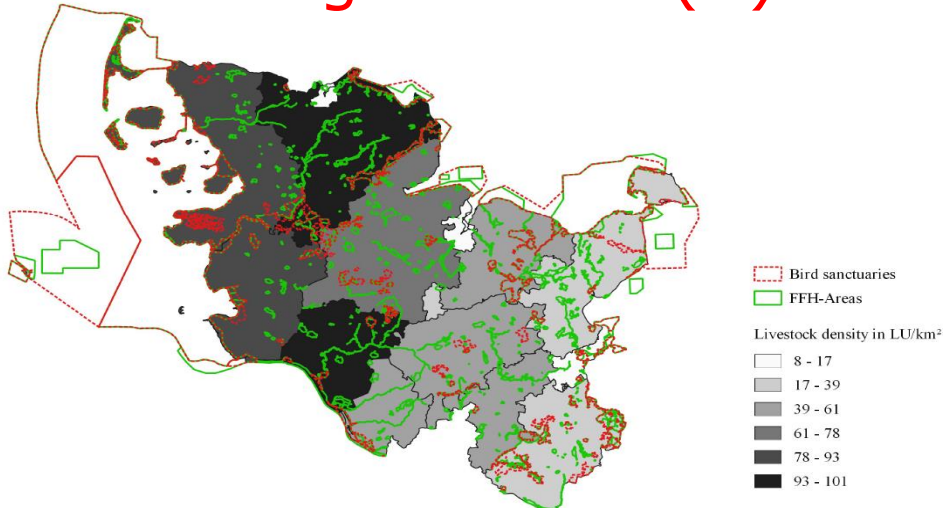
# Denmark Livestock (N)



# The Netherlands (P)



# Schleswig-Holstein (N)



Source: Own graphic based on data from:  
 Landesamt für Landwirtschaft, Umwelt und ländliche Räume des Landes Schleswig-Holstein (Geodaten der Vogelschutz- und FFH-Gebiete)  
 Bundesamt für Kartographie und Geodäsie (Geodaten der Verwaltungsgebiete)  
 Statistische Ämter des Bundes und der Länder, Landwirtschaftszählung 2010 (Daten zur Viehhaltung landwirtschaftlicher Betriebe)



## Livestock intensity (LU/ha)

	DK	SH	NL
Livestock (LU)	4,100	1,015	6,600
Area (UAA) (1000 ha)	2,630	990	1,796
LU/ha	1.5	1.0	3.7

Note: EU livestock units (1 LU = 1 dairy cow)



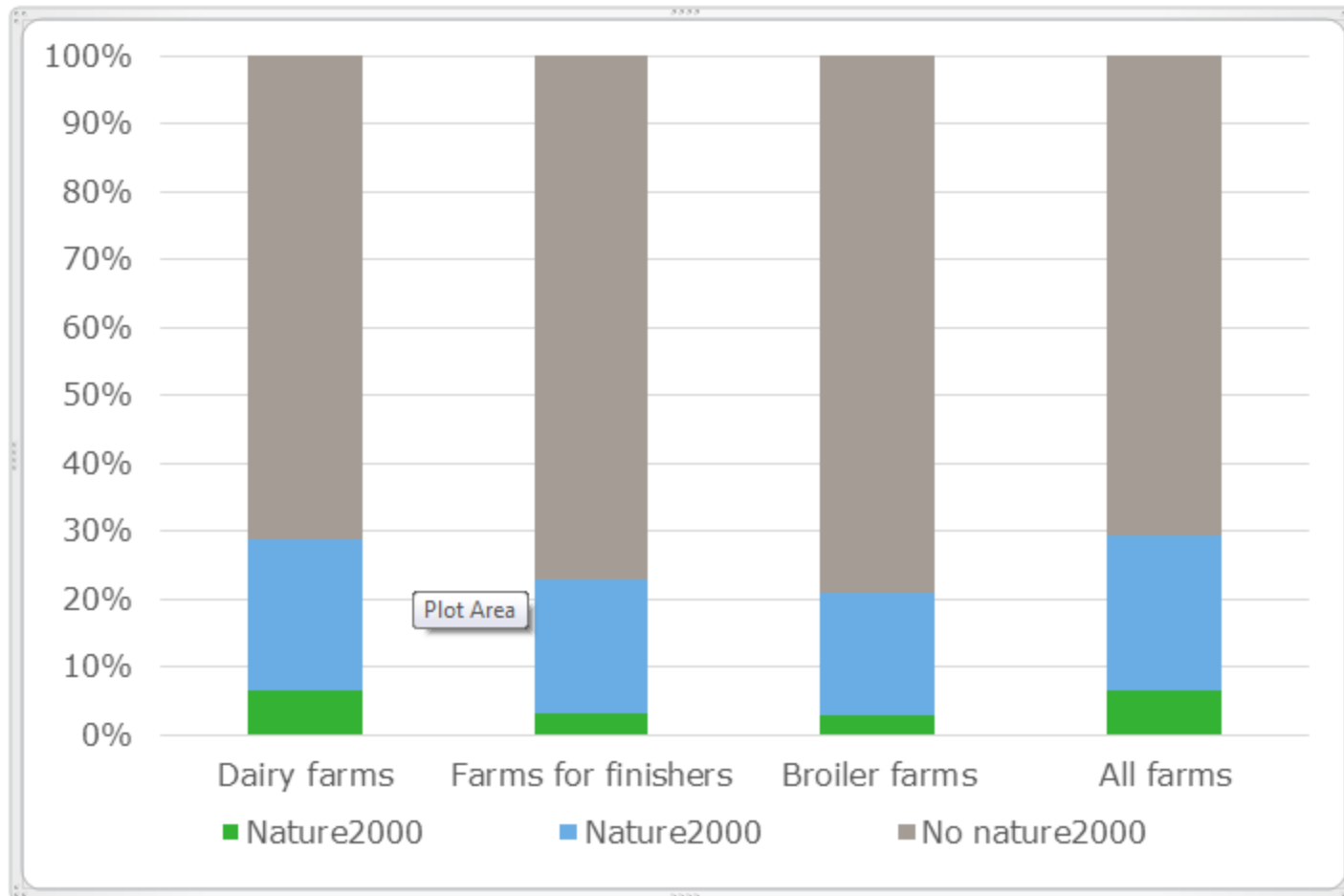


## Agricultural production and Natura 2000

- ✓ **Natura 2000** are Nature protection areas in the EU.
- ✓ Around 8-10% of the total area in the three regions are **Natura 2000** area.
- ✓ Some areas outside Natura 2000 might also be protected
- ✓ The livestock production is not even across the areas in the analysis
- ✓ More permanent pasture in NL. Number of dairy cows in NL is expected to go back to 2015 levels.



## Livestock and distance to Natura 2000 in NL

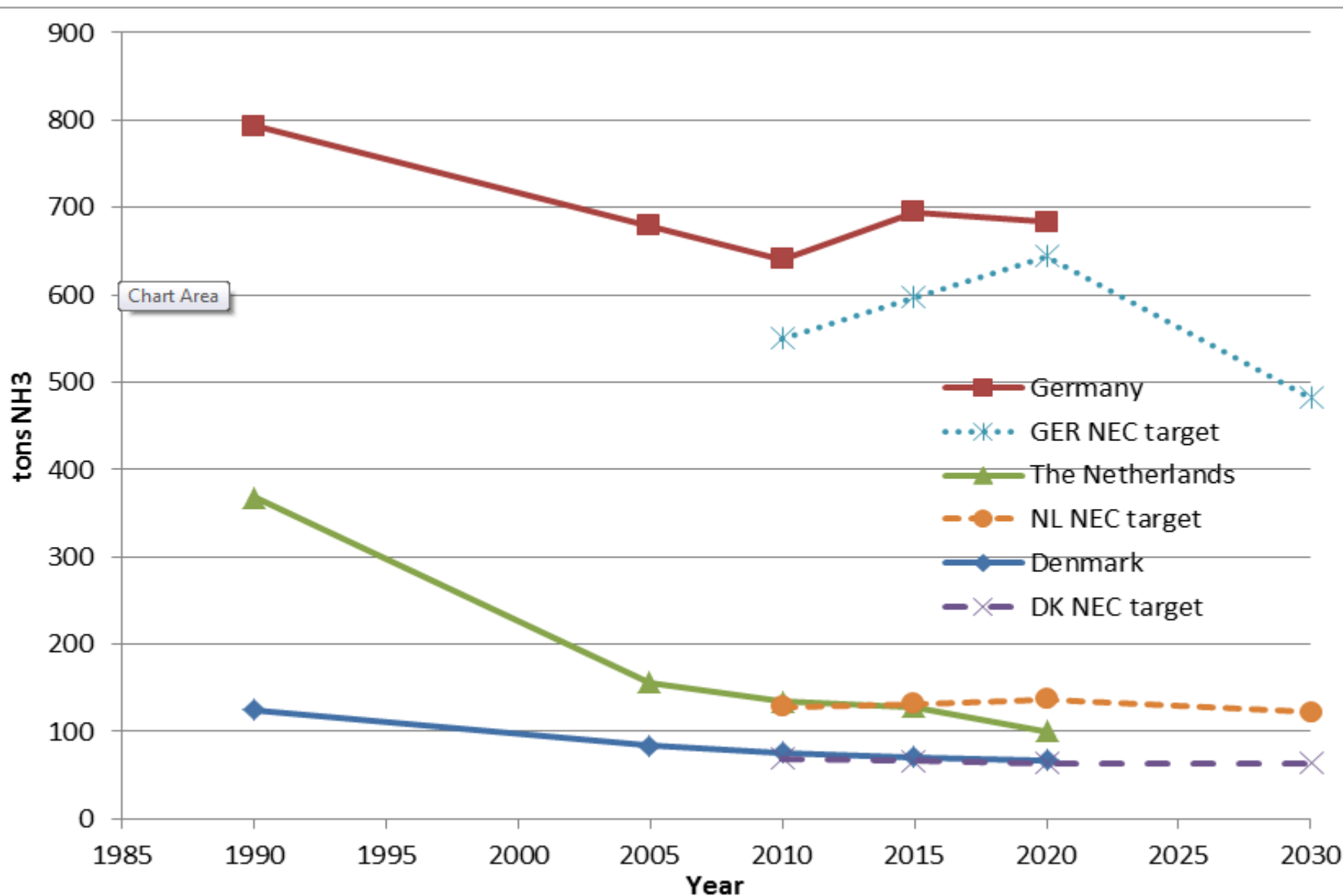


The three groups are: <400 m (green), 400–2000 m (blue) and >2000 m (grey)

**-> Under 5% is close to Natura 2000**



# NEC directive – emission and targets





## BAT requirements (NH<sub>3</sub>/animal place)

	DK	SH	NL
Finishers (Filter Decree)	0.7 – 1.1	2.4 – 4.8 (0.7)	1.5
Dairy cows	5.4	15	11

- BAT emissions per animal place are higher in Schleswig-Holstein than in Denmark and NL except for large pig farms.

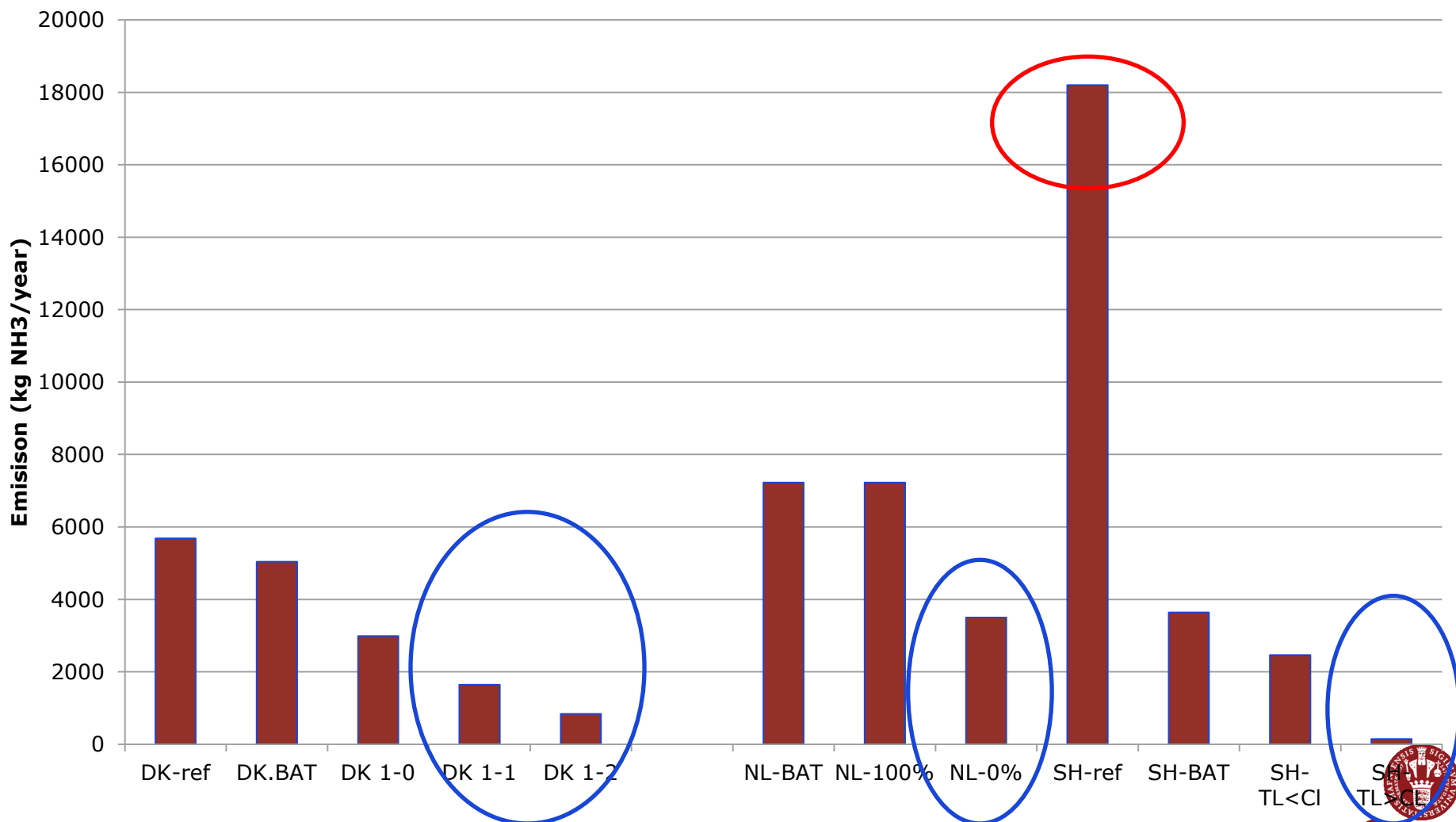




## Case farms 400 and 2000 meters fra Natura 2000

	Before expansion	After expansion
<b>Finishers</b>	<b>7,215 finishers</b> of 32-107 kg / year 33% drained floor and 66% slatted floor. Slurry tanks with a required cover.	<b>14,430 finishers</b> of 32-107 kg. New building and technology has to be decided
<b>Dairy cows</b>	<b>120 dairy cows.</b> Cubicles with slatted flooring and a recirculation manure pit. Slurry tanks with a required cover.	<b>240 dairy cows.</b> New building and technology has to be decided
<b>Boilers</b>	A production of <b>300.000 slaughter chickens</b> annually. A loose housing system. Solid manure	A production of <b>600,000 slaughter chickens</b> annually. New building and technology has to be decided

# Emission targets on finisher case farm (5000 places, 14400 finishers) (DK, SH og NL)



*Note: The weights interval used is not the same in the three countries*



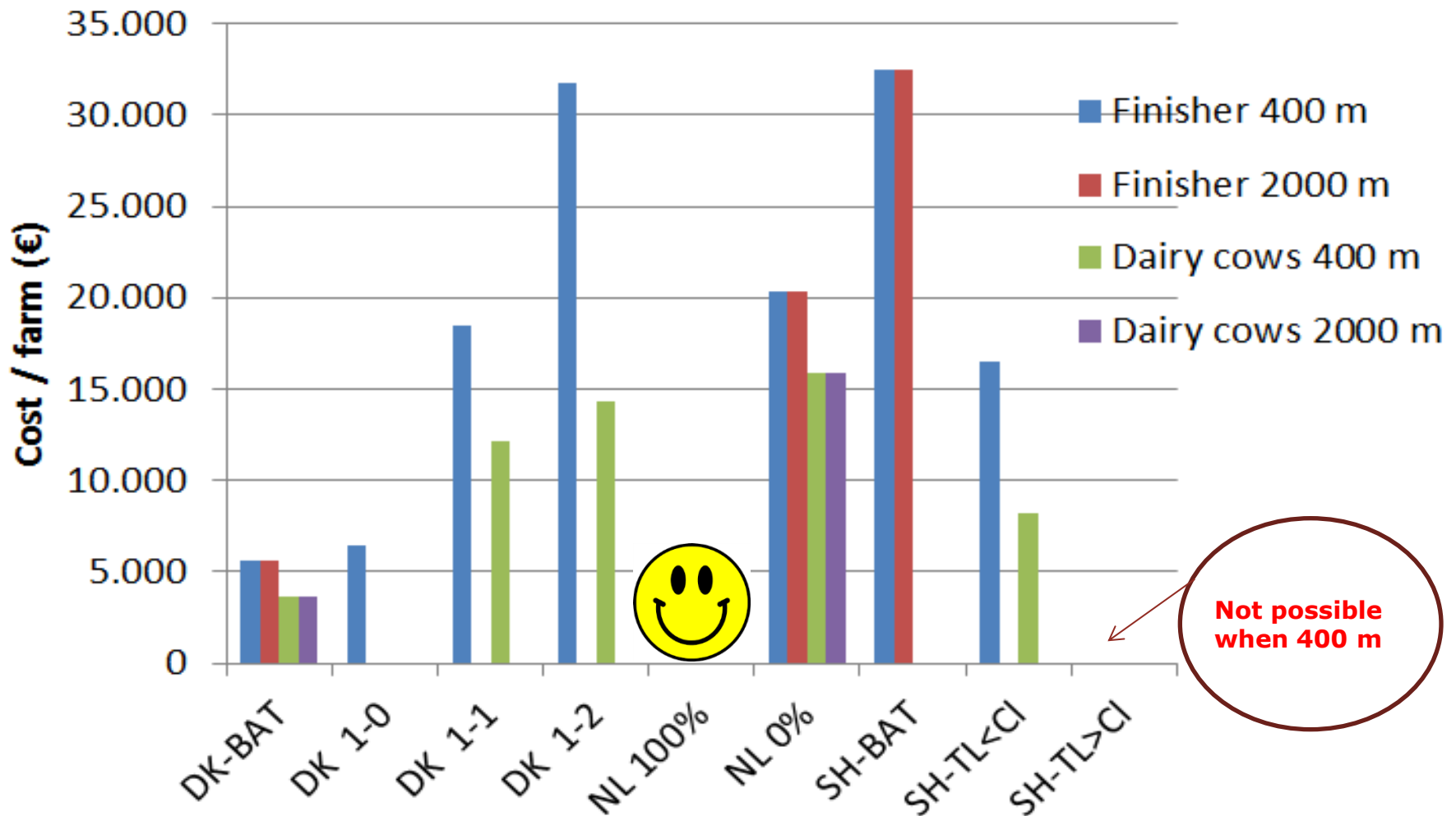
## Technologies used on case farms

	DK	SH	NL
Finishers	Partly solid floor Air scrubber	Air Scrubber <b>Acidification</b>	Air scrubber
Dairy cows	Low emission stables Acidification	<b>Acidification</b>	Low emission Manure slides
Broilers	Heat exchanger	Air filter	Tube heating

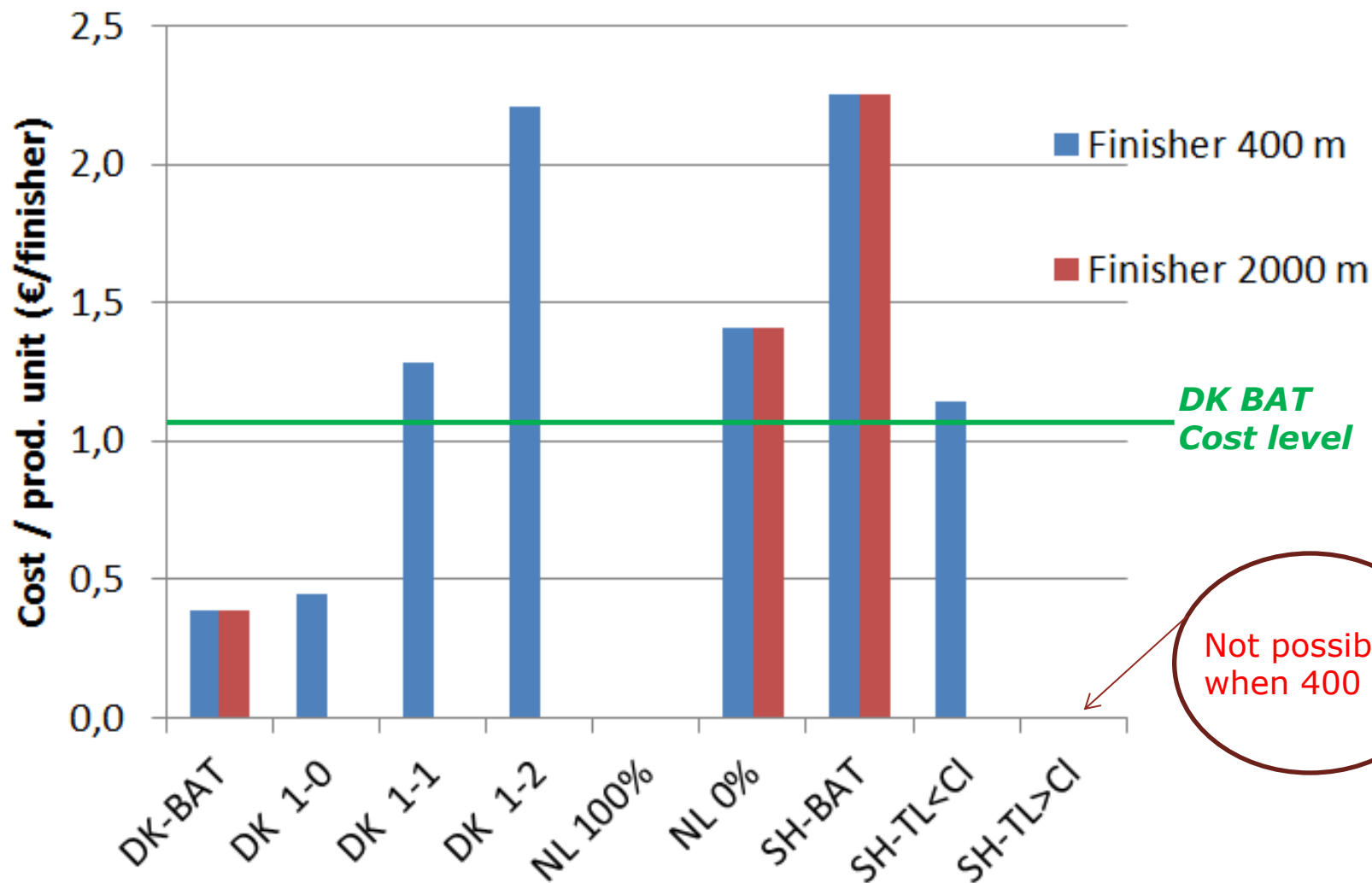


# Cost of technologies (€ / farm)

- Cost of BAT and additional costs on top of BAT



## Acceptable cost of technologies (€/finisher)





## **Final remarks - I**

- ✓ **Difficult to compare when regulations and approaches are different**
- ✓ **NL have highest livestock intensity and have highest deposition**
- ✓ **Not much livestock very near to Natura 2000 in DK and NL**
- ✓ **Emission have a decreasing trend in Denmark and NL, not yet in GER.**
- ✓ **Technology requirements (+BAT) are larger in DK+NL, than SH but Filter Decree does reduce emissions on large pig farms**





## **Final remarks - II**

- ✓ **The regulatory set up is very different (Neighbour, CL $\leftrightarrow$ TL, "room for develop.")**
- ✓ **With strict requirements and 400 meters the costs are high and the technology might not be available (lowest cost in NL)**
- ✓ **With light requirements and with 2000 meters the cost are often 0 (highest cost in NL)**
- ✓ **Reduction costs per NH<sub>3</sub> seems to be lowest for broilers and most expensive on dairy farms.**







## Homepage :

[https://ifro.ku.dk/english/research/projects/projects\\_environment/ammonia\\_regulation-of-livestock/](https://ifro.ku.dk/english/research/projects/projects_environment/ammonia_regulation-of-livestock/)

### The overall conclusive report in Danish:

[Ammoniakregulering af husdyrbedrifter i forhold til ammoniakfølsom natur \(Natura 2000\) – sammenligning af Tyskland, Holland og Danmark: Samlerapport. IFRO report 273.](#)

### Economic reports

[Economic analysis of ammonia regulation in \*\*Germany\*\* \(Schleswig-Holstein\) in relation to the Habitat Directive](#)

[Economic analysis of the ammonia regulation in \*\*Denmark\*\* in relation to the Habitat Directive](#)

[Economic implications of ammonia regulation in \*\*the Netherlands\*\* near nature 2000 areas](#)

[Ammonia regulations near nature areas in Denmark and the Netherlands compared](#)

[Economic analysis of the ammonia regulation with respect to Nature 2000 sites: Germany, The Netherlands and Denmark](#)



