

23rd INTERNATIONAL SYMPOSIUM OF

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SEGES, DENMARK

CONSEQUENCES OF REDUCING THE NITROGEN INPUT BELOW THE OPTIMUM



STØTTET AF
promilleafgiftsfonden
for landbrug



ALREADY IN 1983,
THE DANISH
FARMERS' UNION
ASKED FOR/
DEMANDED
INTENSIVE ADVICE
ON HOW TO
ENHANCE THE
UTILIZATION OF
ANIMAL MANURE

DE DANSKE LANDBOFORENINGER

Landskontoret for Planteavl
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Den 13. juli 1983.
KØ/da

Kære Frank Bennetzen,

Jeg har forstået på Ib Skovgaard, at der er en smule tvivl om i hvilket omfang, der her fra De danske Landboforeninger er ønsket om en intensiveret rådgivningsindsats vedrørende hele staldgødningsproblemet.

For at rydde denne tvivl til side sender jeg vedlagt formandskabets meddelelser til bestyrelsesmødet den 18. maj. På side 2 i meddelelserne har formandskabet søgt og fået bestyrelsens tilslutning til at bede landsudvalget for planteavl om at tage denne rådgivningssag op.

Jeg beklager, hvis vi har forsømt at give jer besked herom, men dette er forhåbentlig hermed rådet bod på.

Med venlig hilsen

UTILIZATION OF ANIMAL MANURE IN DANISH AGRICULTURE

- 3 PERIODS:

- **Until 1980: Bad manure management.**
Nitrogen utilization below 20 per cent.
- **1985-1999: Enormous improvements**
Utilization rose to 70 per cent
- **After 2000: Starving crops**

ACTION PLAN FOR BETTER UTILIZATION OF ANIMAL MANURE - DANISH FARMERS' UNION 1987



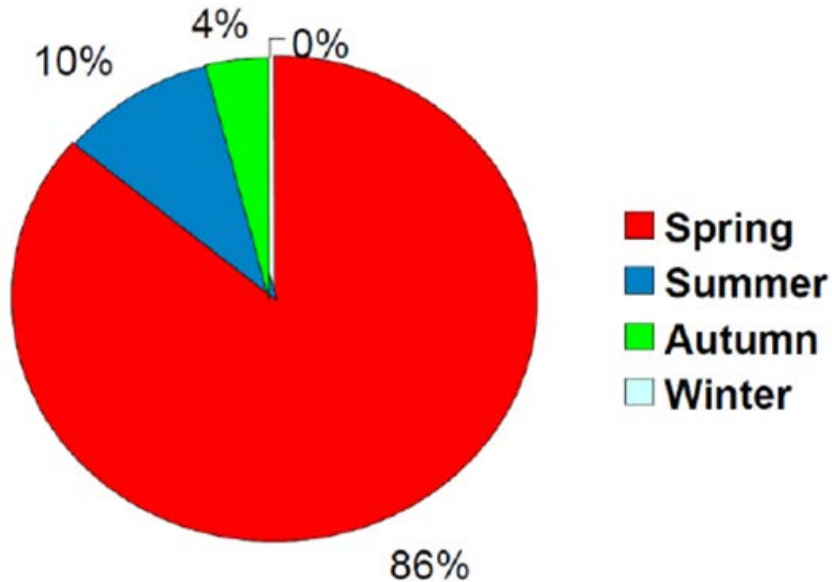
Year	Action plan/legislation	Main instruments
1985	NPO – Nitrogen, Phosphorus and organic matter	Maximum livestock per hectare No direct outlets of manure
1987	Water environmental protection plan I	Mandatory fertilizer plans Demands for storage capacity of slurry, “wintergreen fields”
1992	Sustainable agriculture	Max quotas for nitrogen Minimum utilization of N in manure Restriction for slurry application in autumn.
1998	Water environmental protection plan II	Reduced N-quotas to 10 per cent below optimal rates. Demands to catch crops Establishing “wetlands”
2003	Water environmental protection plan III	Extended demands for catch crops Extended demands for utilization of manure
2009 6	“Green Growth”	Extended demands for catch crops Specific regulation of vulnerable areas No tillage in autumn before spring sown

RESTRICTIONS IN APPLICATION TIMES

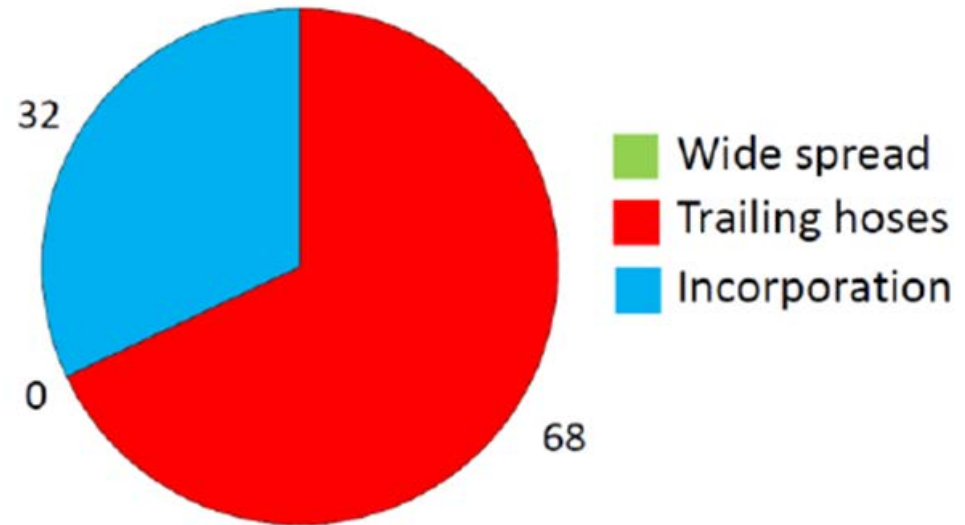
Type	Restrictions	Technique
Liquid manure	<p>No application from harvest to 1st of February. Except: from harvest to 1st of October to winter oilseed rape and grass From harvest until 15th of October to grass for seed</p>	<p>From 2011 direct injection on bare soils and grass. Only in winter cereals trailing hoses are OK</p>
Solid manure	<p>Without crop in winter: Banned from harvest until 1st of November</p>	<p>Incorporation on bare soils within 6 hours</p>

Slurry is gold

Application of slurry



Spread of slurry



Trailing hoses



Injection

RESULT:

THE NITROGEN LEACHING IS REDUCED BY MORE THAN 50 PER CENT.

NITROGEN QUOTA

- The quotas for each crop is based on optimal rates
- The optimal quotas are reduced with a percentage to give the "Maximum national quota"
- The reduction from optimal rates is 18,2 percent in 2015. (>20 percent in 2016)
- The farm quota is used by N in animal manure, organic manure or in mineral fertilizer

FERTILISER PLAN AND -ACCOUNTS

- All farms must do a fertiliser plan
- All farms must do and report a fertiliser account
- The fertilizer account is based on:
 - The N-quota on the farms calculated from crop distributions, soil types and nitrogen quotas for each crop
 - Mineral fertilizer reported to the ministry by the sales companies
 - The amount of nitrogen in animal manure calculated from standards for each type of animal manure
- If the quota is exceeded the farmer will have a fine (1,5 to 3 Euro per kg N).

A SIMPLE EXAMPLE

Crop	Ha	Quota per ha	N-Quota total
Winter wheat after oilseed rape	20	129	2580
Winter wheat	20	138	2760
Winter barley	20	136	2720
Winter oilseed rape	20	175	3500
Spring barley	20	110	2200
Total	100		13760
Effect of mandatory catch crops:	14	25	350
Net quota			13410
Animal manure		Kg N per 10 pigs	Kg N total
Total N from 5.000 produced pigs (31-107 kg)		25,1	12550
Minimum utilization (75 percent)			9413
Rest quota for mineral fertilizer			3998
Rest quota for mineral fertilizer per ha			40

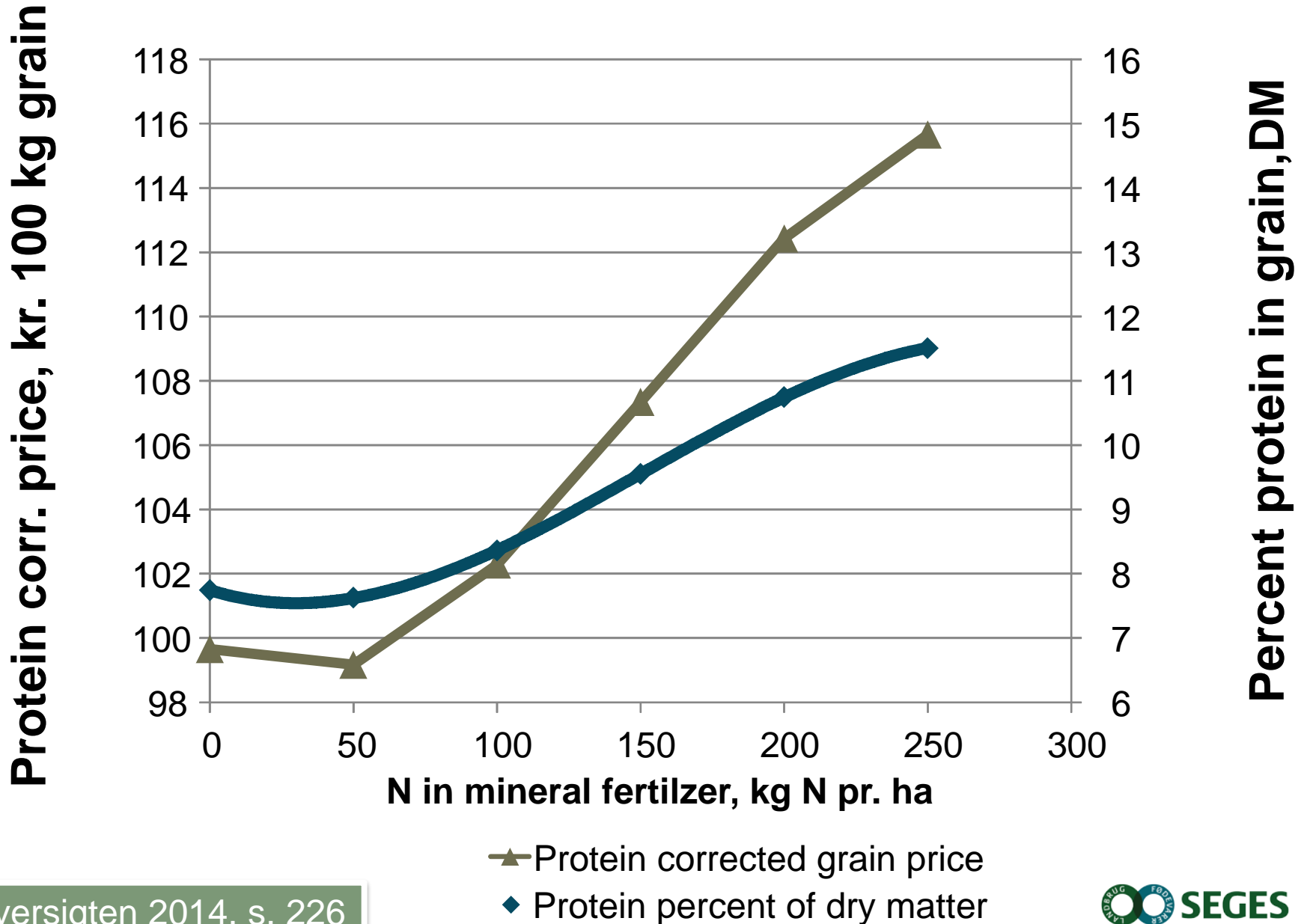
OUTLINES OF LEGISLATION FOR ANIMAL MANURE

- Min. Utilization of N: Pig slurry 75 pct, Cattle slurry 70 pct. Deep Litter 45 pct.
- Allowed times for application for slurry: Only spring - except until 1th of October for oilseed rape and grass
- Application technique:
 - On bare soils (before crop establishment): Injection or acidification
 - On grassland: Injection or acidification
 - On winter cereals: Trailing hoses (no demand for injection or acidification)
- Max. Livestocks Units (100 kg N) per ha :
 - Cattle 1,7
 - Other animals 1,4

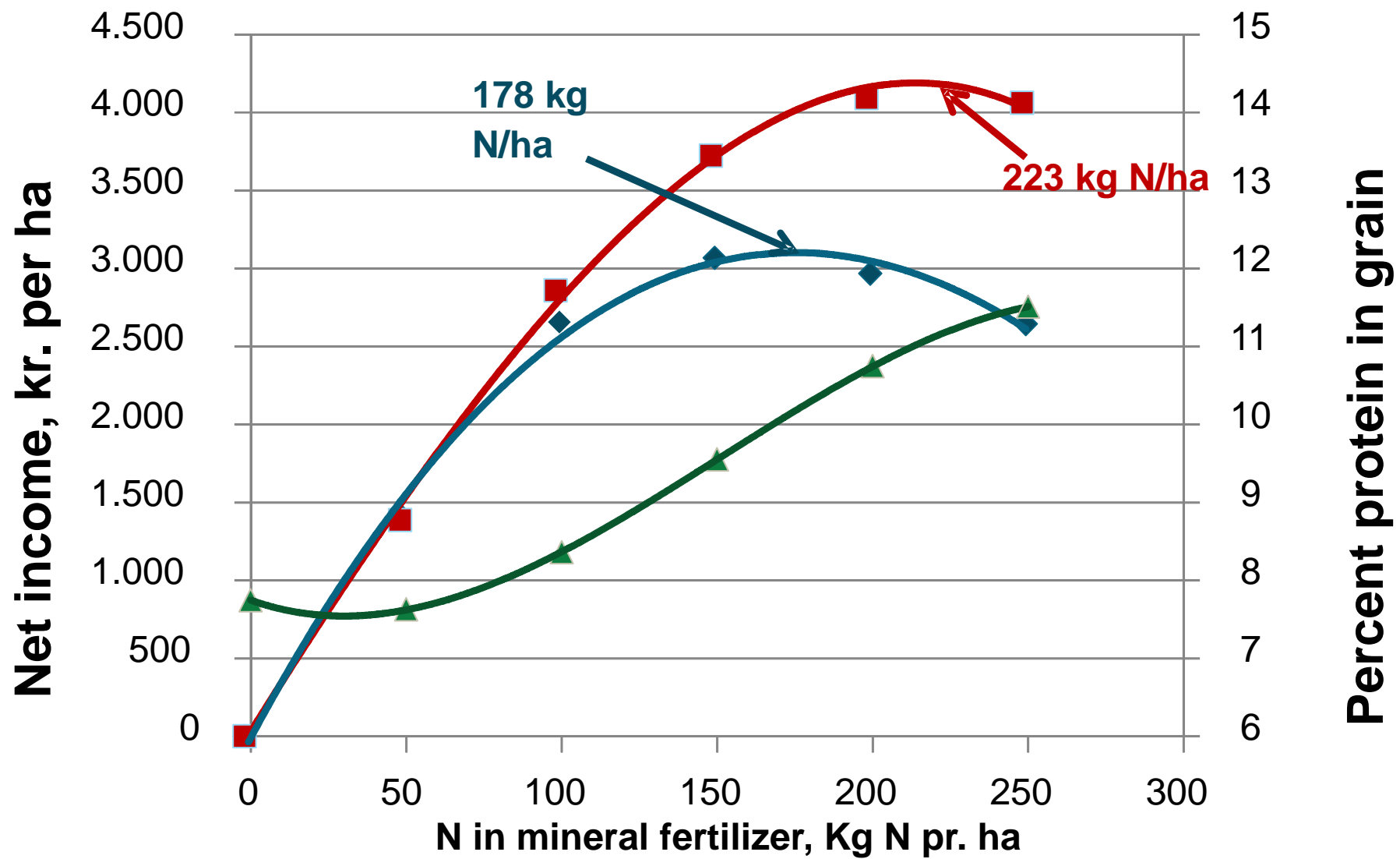
SETTING THE N-QUOTAS

- Based on traditional plot trials with increasing amounts of Nitrogen
- Optimal rates are calculated at average of 5 years prices for crops and nitrogen
- Values for protein is incorporated in the calculation

N for winter wheat, 19 trials 2014

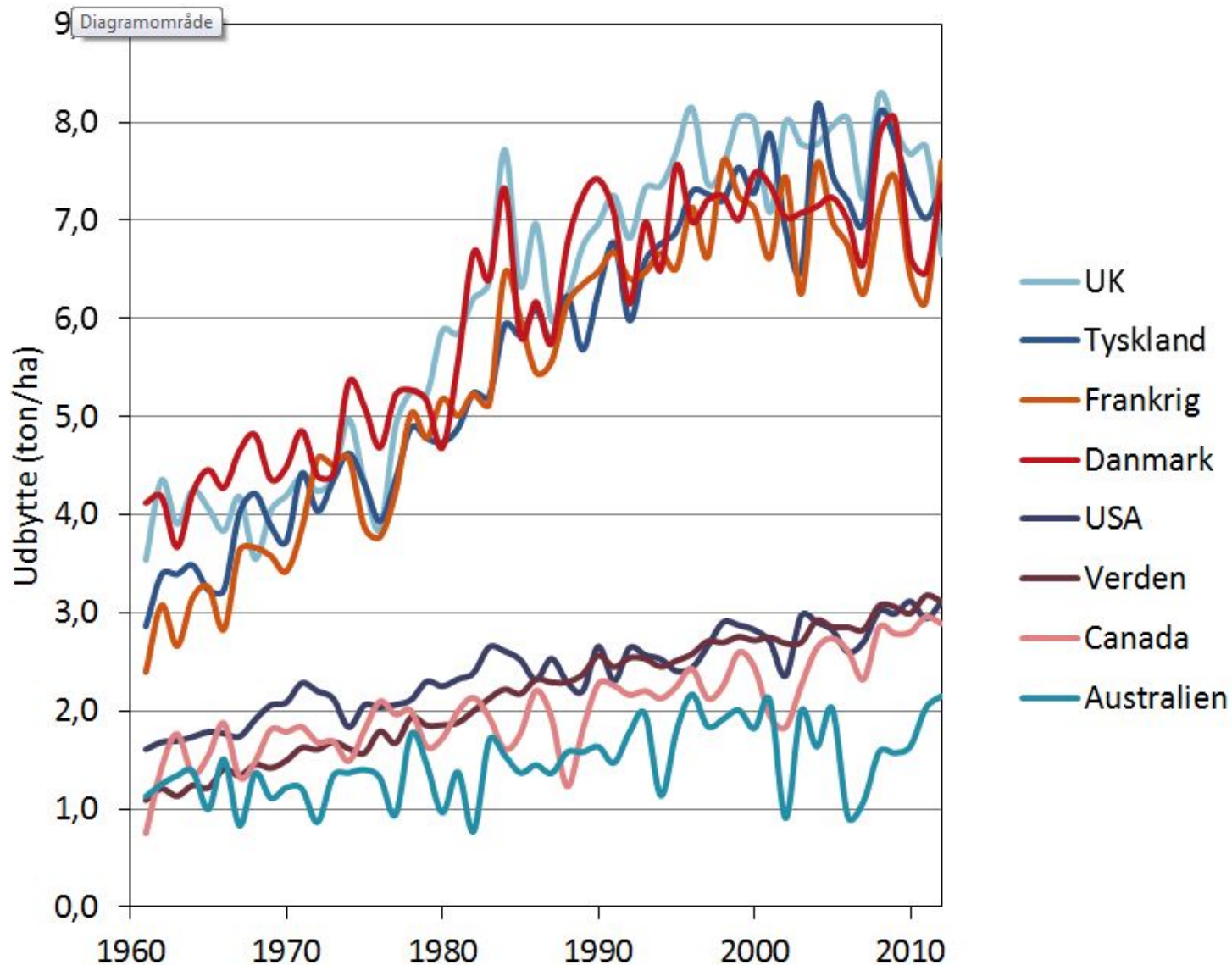


N to winter wheat, 19 fs. 2014

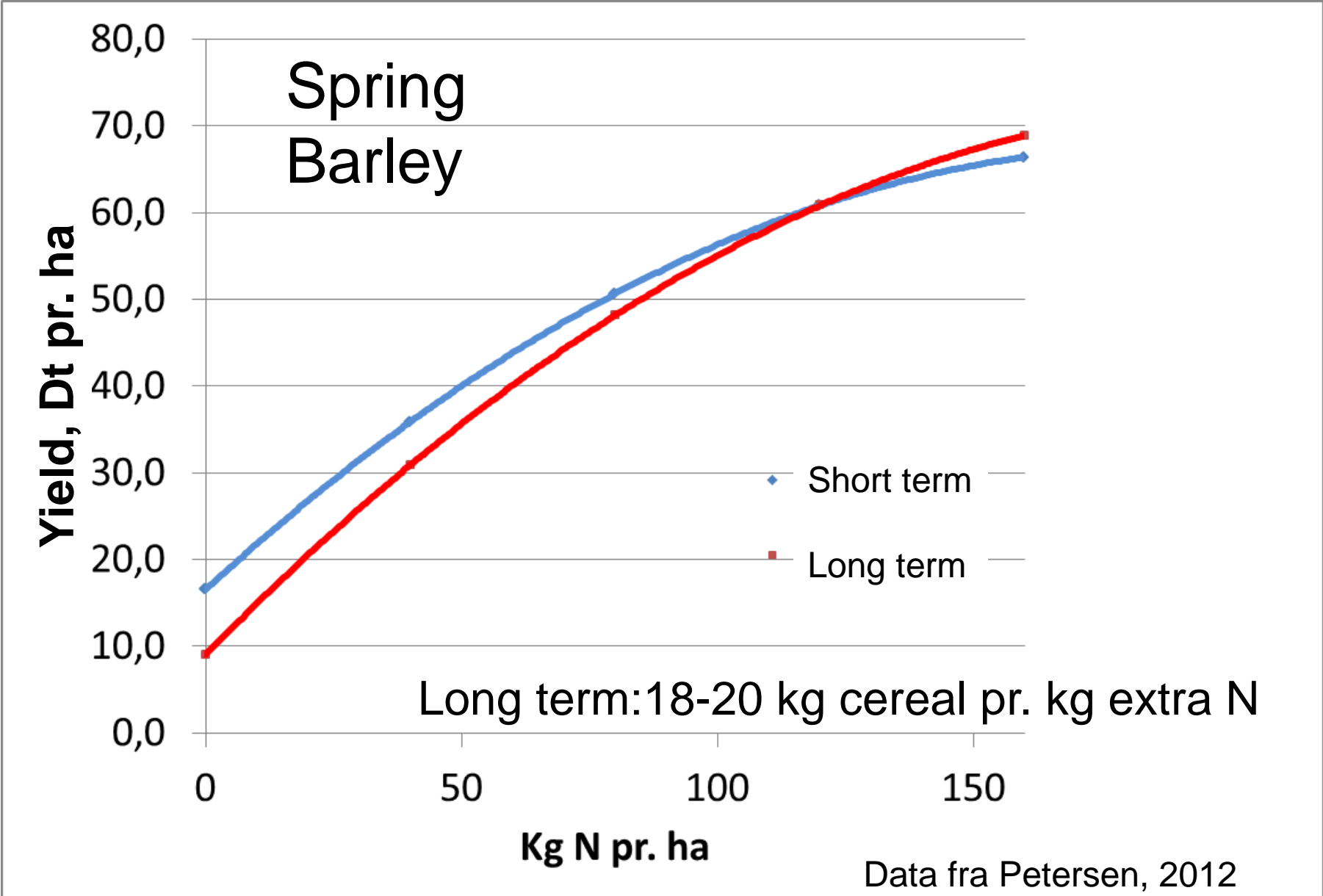


**WINTER
WHEAT
YIELD
1960 –
2012**

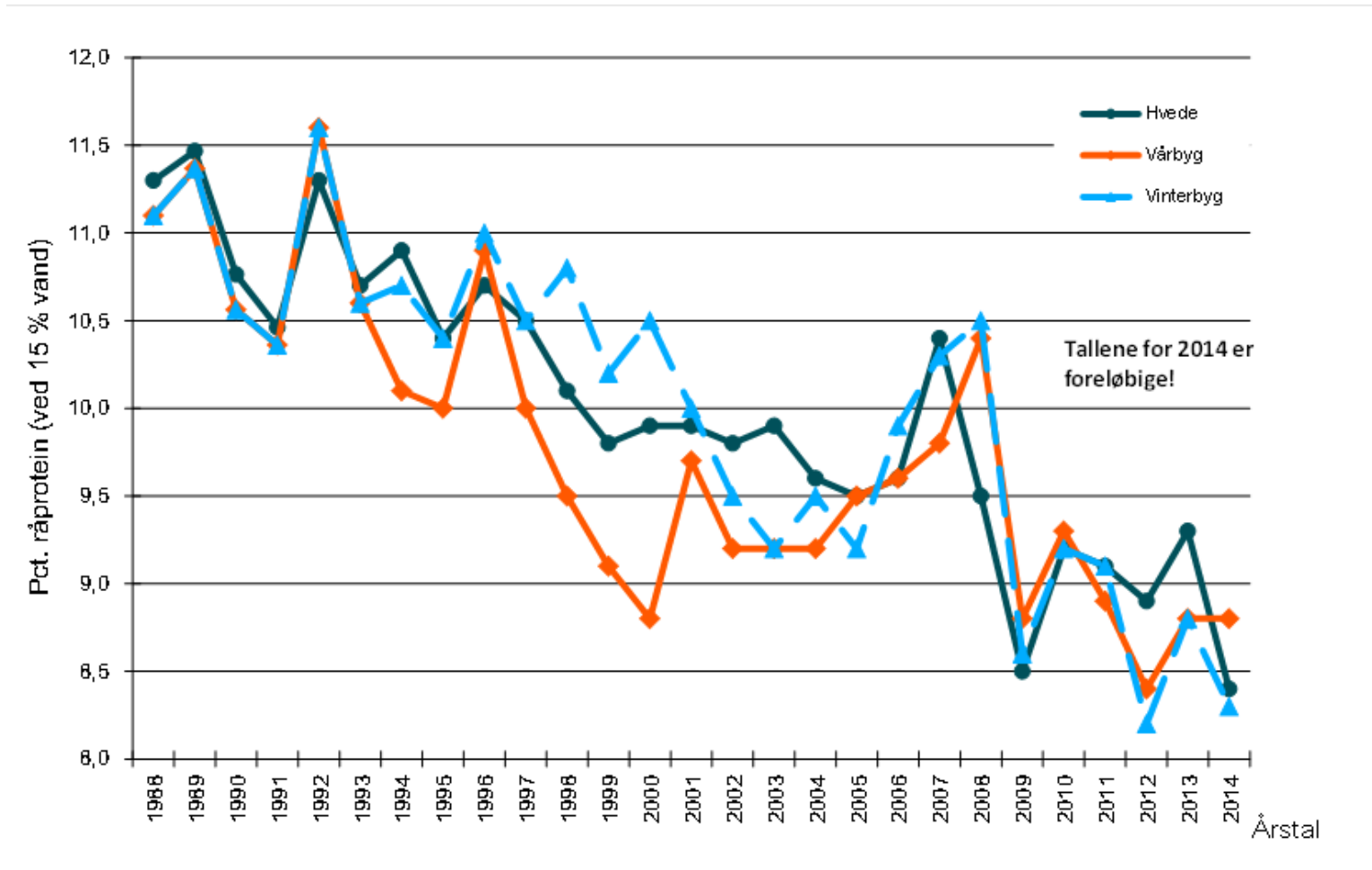
**TONNES
PER
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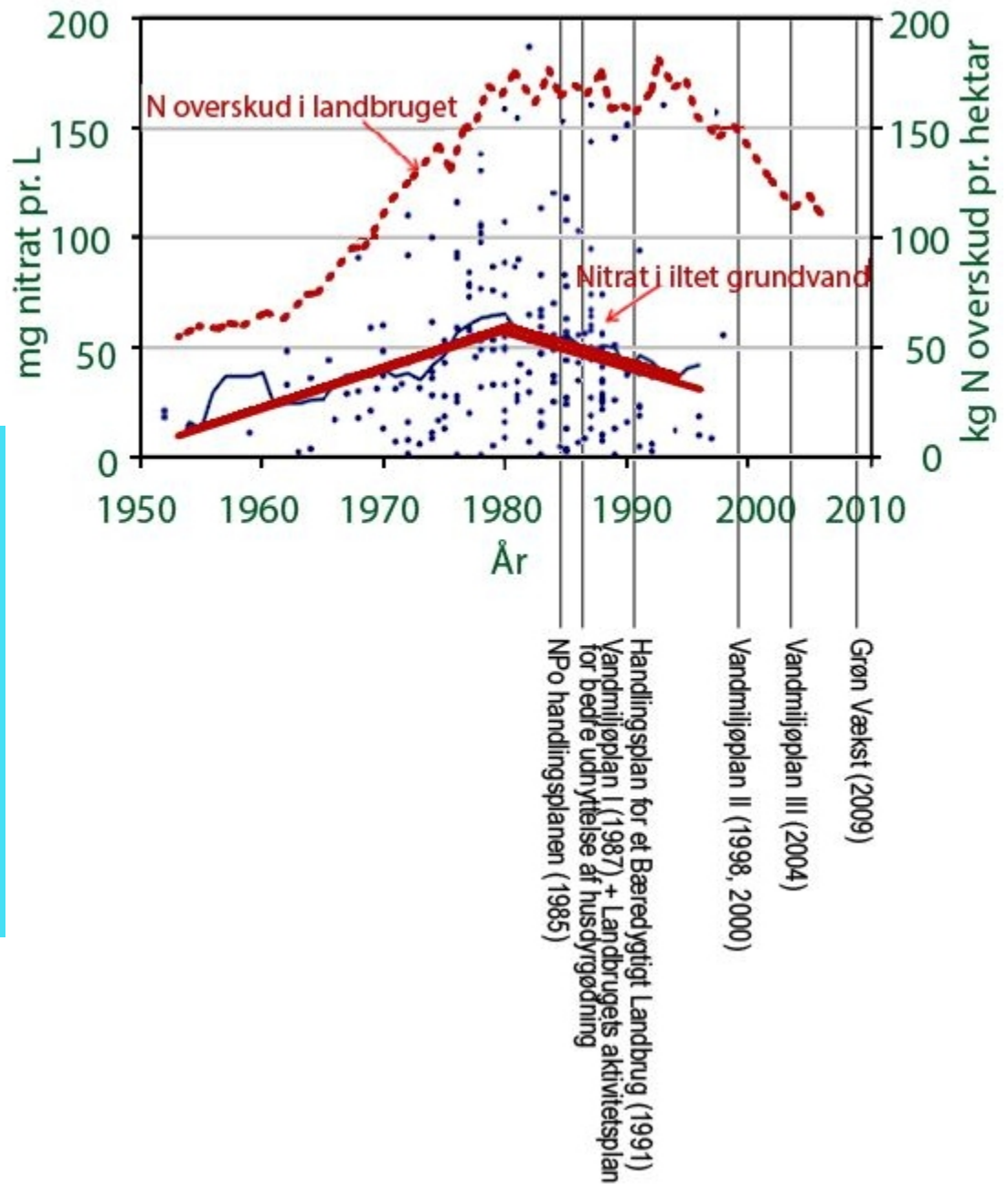
Response curve for one year and long term trials



PROTEIN CONTENT IN CEREALS 1986-2014



DECREASING NITRATE CONTENT IN THE OXIDIZED GROUND WATER SINCE 1980.



OUTLINES

- Regulation in DK is based on Nitrogen Quotas 20 per cent below optimal rates
- High demands for utilization of N in animal manure
- Mandatory catch crops and restriction in soil tillage and ploughing of grass
- The Nitrogen surplus have been reduced by 50 percent
- The protein content of danish crops are very low. We have problems to fulfill qyality standards on the world markets
- The loss of yield by restricted N-quotas is 0,5-0,7 t/ha
- The loss of N to the coast have been reduced by more than 50 percent since 1985
- The sub optimal rates of N-application cost Danish farmers 100 to 200 Euro per hectar per Year
- On top of that new targets in WFD will terminate farming in some areas.