

Hindsgavl 30. November 2016

Lars Bonde Eriksen

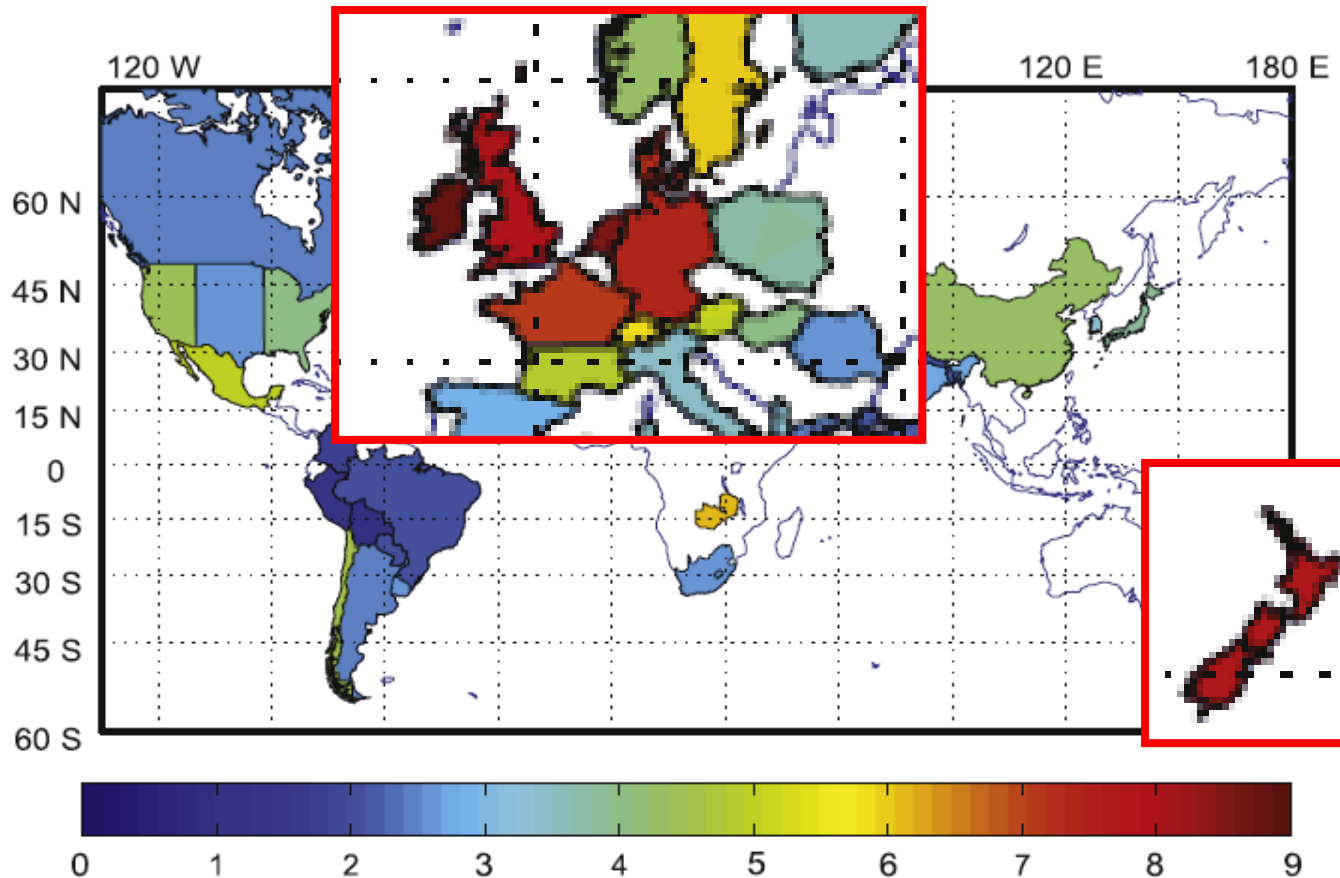
INCREASING YIELDS OF WINTER WHEAT IN DENMARK

TWO 3 YEAR PROJECTS

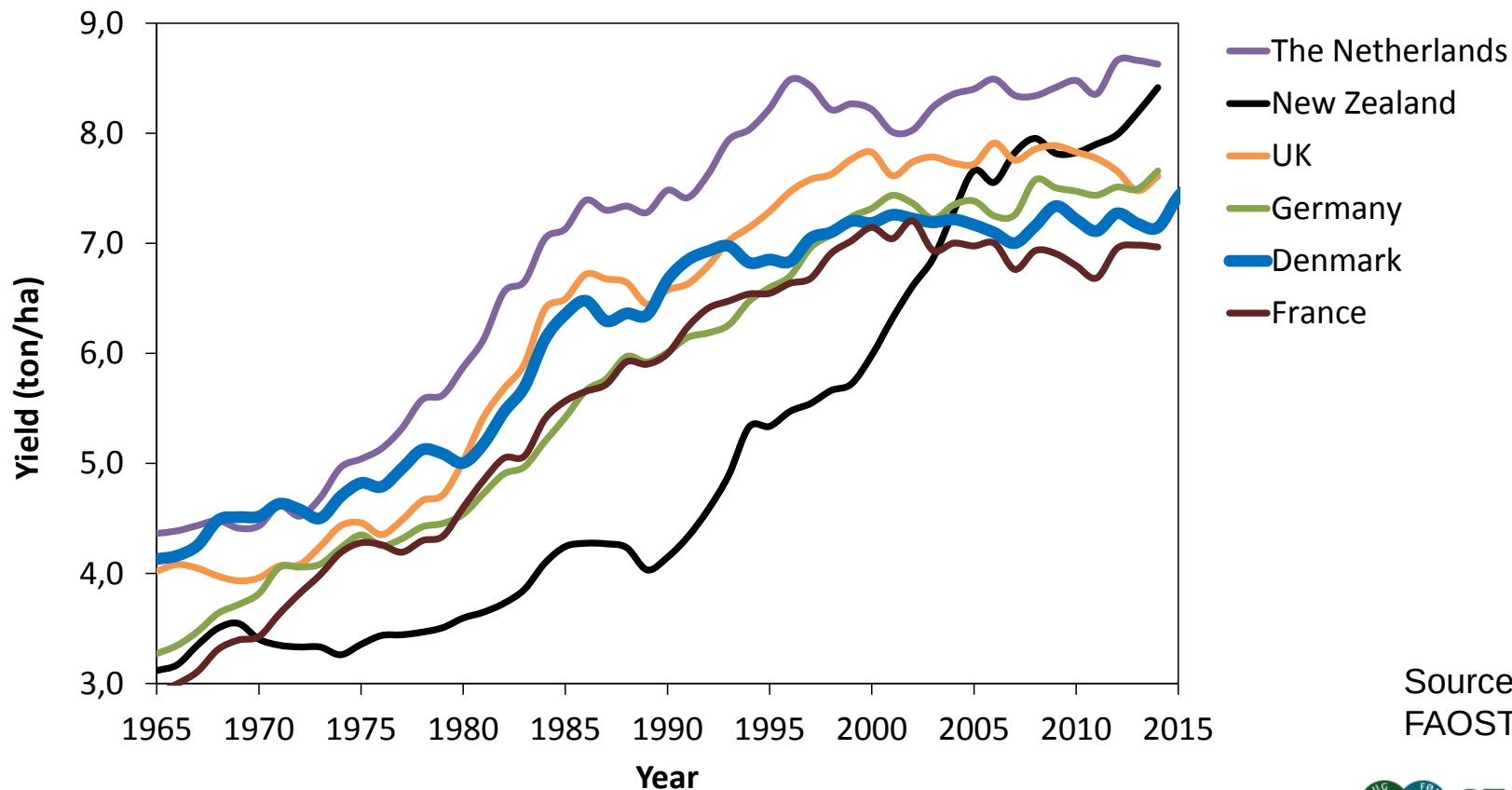
- Funded by Promilleafgiftsfonden
- Ny udbyttefremgang i planteavlen
 - Winter wheat
 - Winter rape
 - Spring barley
- Forbedring af afgrødernes udbytte- og produktionsmæssige egenskaber (FAUPE)
 - Improved breeding methods
 - Root measurements, NUE, Drought tolerance
 - Measurements on biomass
 - Genomic breeding

GLOBAL WHEAT YIELDS

Lin & Huybers, 2012

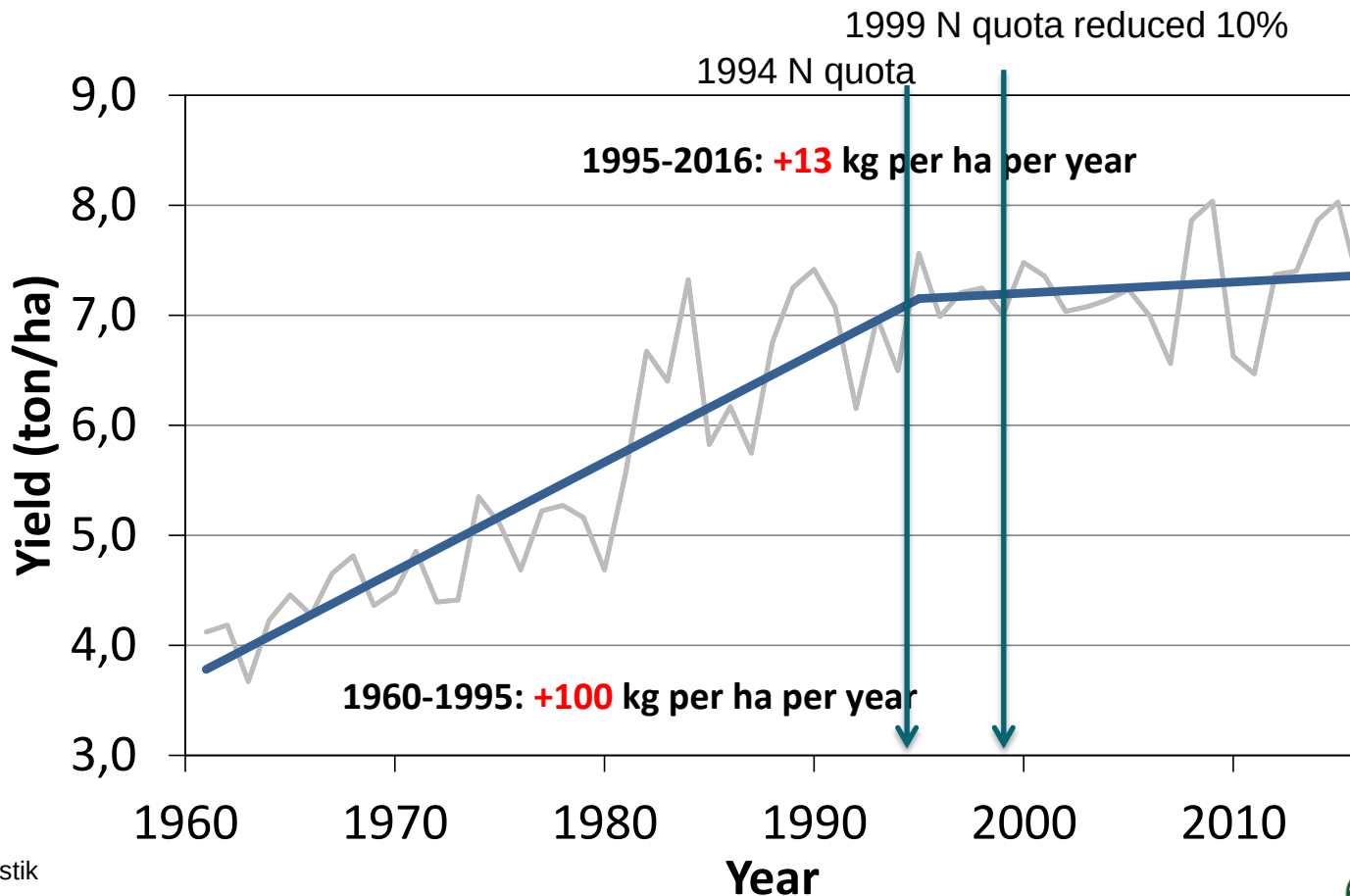


EUROPEAN WHEAT YIELDS

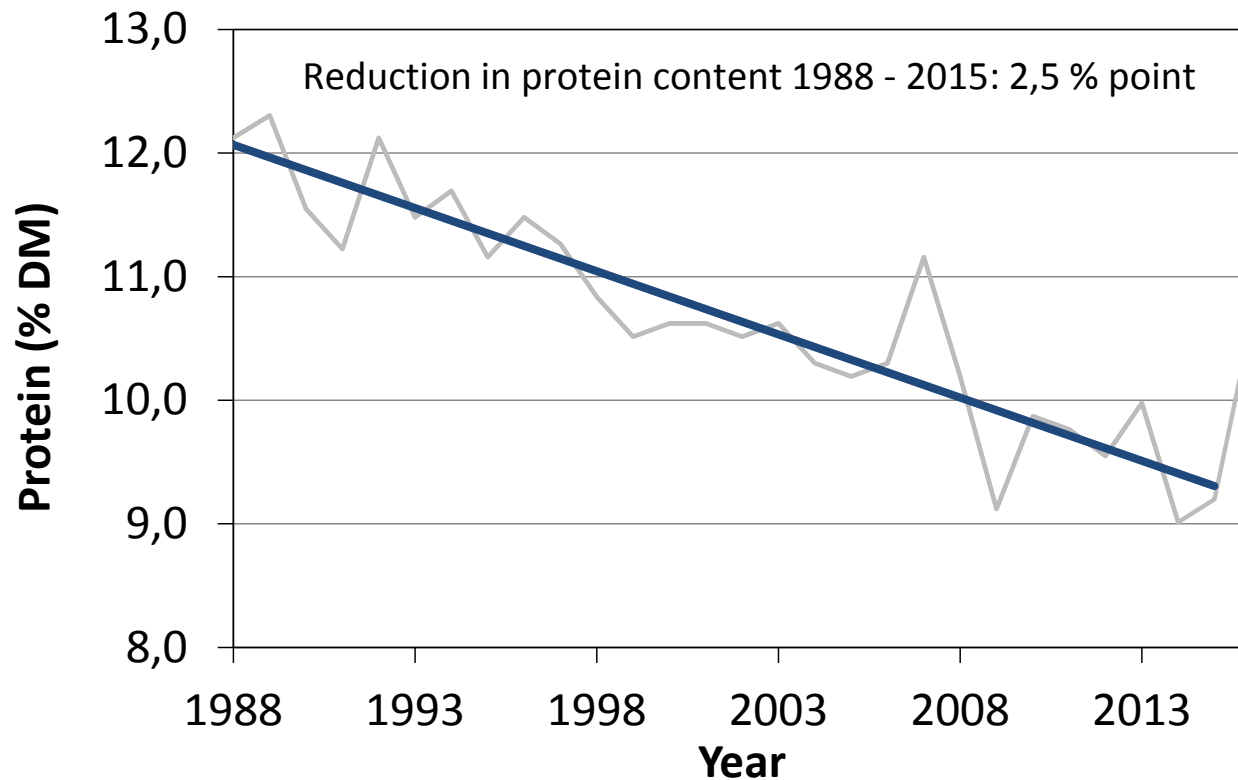


Source:
FAOSTAT

WHEAT YIELDS IN DENMARK 1960 - 2016



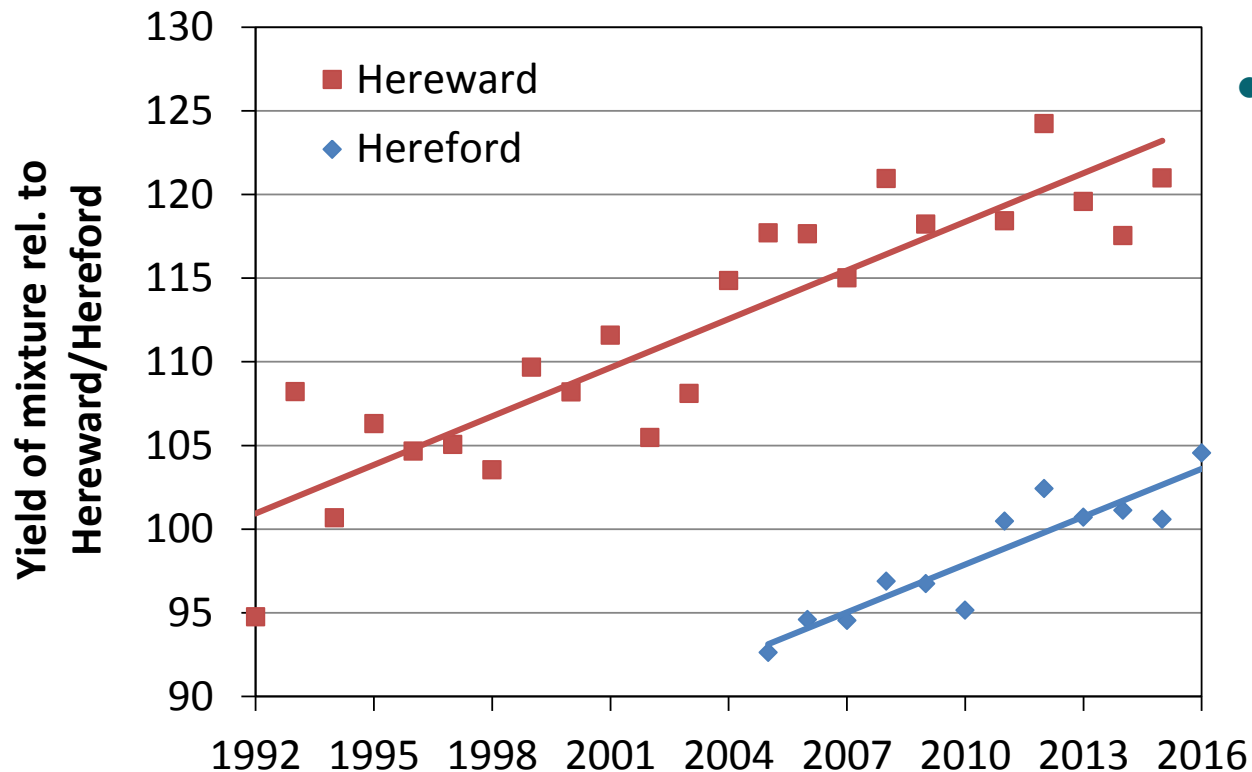
PROTEIN CONTENT, FEED WHEAT



SEGES – Videncenter
for Svineproduktion



YIELD PROGRESS FROM BREEDING



● Yield progress = 1 %/year

Source: Farmer union/VCU trials

YIELD POTENTIAL IN WINTERWHEAT

- Trials 2014, 2015 and 2016
- Purpose:
 - Determine potential yield
 - Develop agronomic strategies for higher yield
 - Evaluate environmental impact of added nitrogen
 - Compare traditional trials with large plot trials



FERTILIZER STRATEGIES, 2015 AND 2016

Strategy	Nitrogen, kg/ha	Nitrogen applications, kg/ha					Micro- nutri- ents, #treat.	PGR, #treat.
		Sept- ember	Early spring	GS 30-31	GS 32	GS 49		
Max yield	350	30	70	130	70	50	3	3
Optimum	215		50	115	50		2	2
Quota	2015: 150 2016: 180		50 50	100 130			0	0-1
German	245		80	100		70	0	3

NITROGEN

- Max yield
 - Nitrogen applied = amount taken up in grain and straw in a crop yielding 15 ton/ha with 11,5 % protein + 60 kg/ha
- Optimum
 - The expected economic optimum, depending on yield potential in the individual field
- Quota
 - The quota allowed on the particular site

FUNGICIDE STRATEGY, 2015 AND 2016

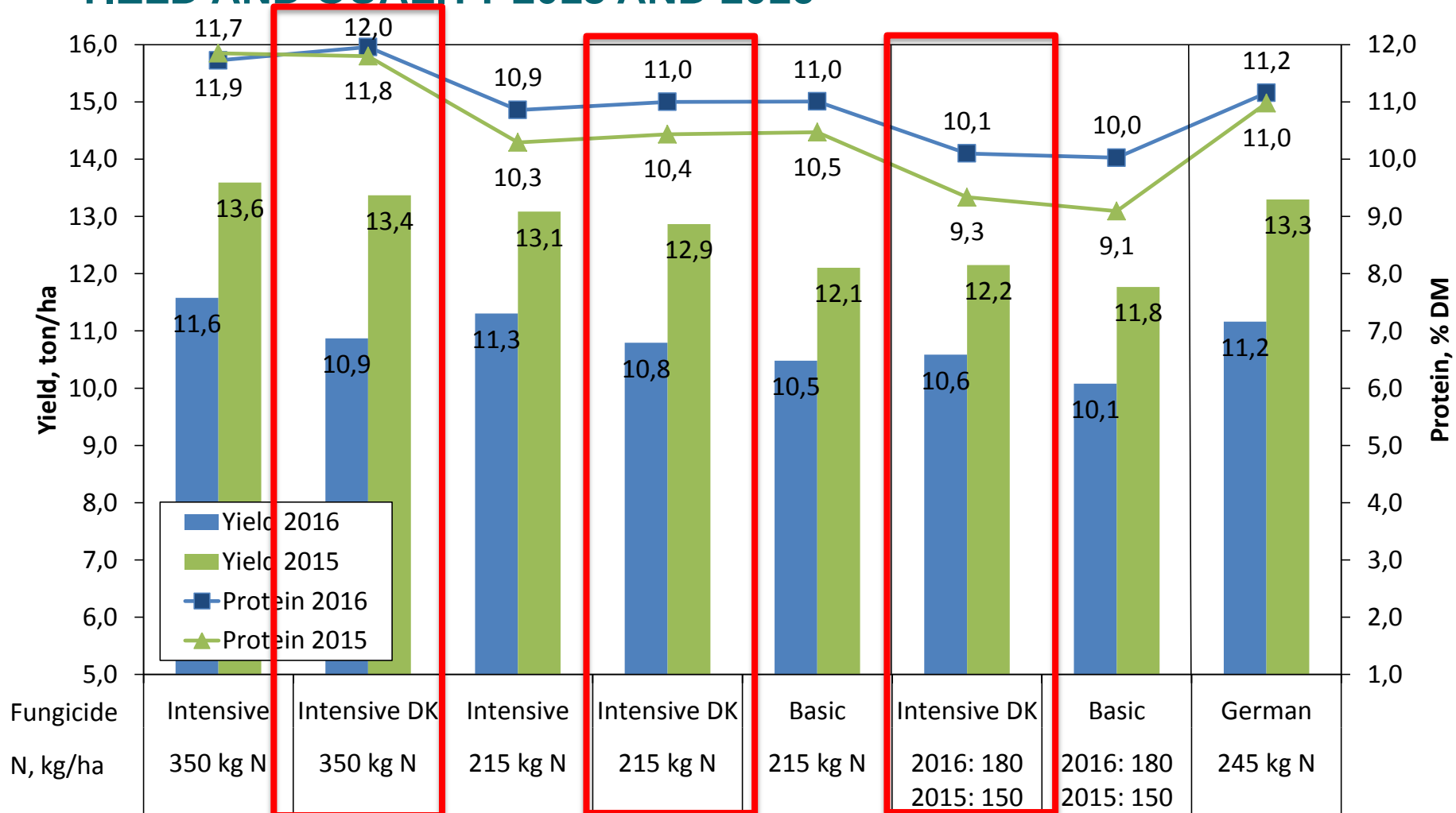
Strategy	GS 28-30	GS 31	GS 32-33	GS 37-39	GS 55-59	GS 61-63	GS 71
Intensive	0,3 Vegas 0,8 Proline 1,5 Bravo 0,2 Comet		0,75 Bell 0,15 Talius 1,5 Bravo	0,6 Aviator Xpro	1,5 Ceriax		0,4 Proline
Intensive DK, 2015	0,5 Comet 0,25 Flexity 1 Folpan		0,7 Prosaro	1 Viverda	0,45 Bell 0,25 Proline		0,4 Proline
Intensive DK, 2016		0,3 Comet 0,6 Prosaro	0,5 Prosaro	0,75 Viverda	0,45 Bell 0,25 Proline		
Basic	0-0,2 Flexity 0-0,3 Comet 0-1,0 Folpan		0-0,35 Prosaro	0,6 Viverda	0,3 Bell 0,15 Proline		
German	1 Bravo 0,3 Flexity	0,5 Proline 0,2 Talius 1,0 Bravo		1,5 Ceriax		0,5 Proline 0,5 Folicur	

Not approved for use in Denmark

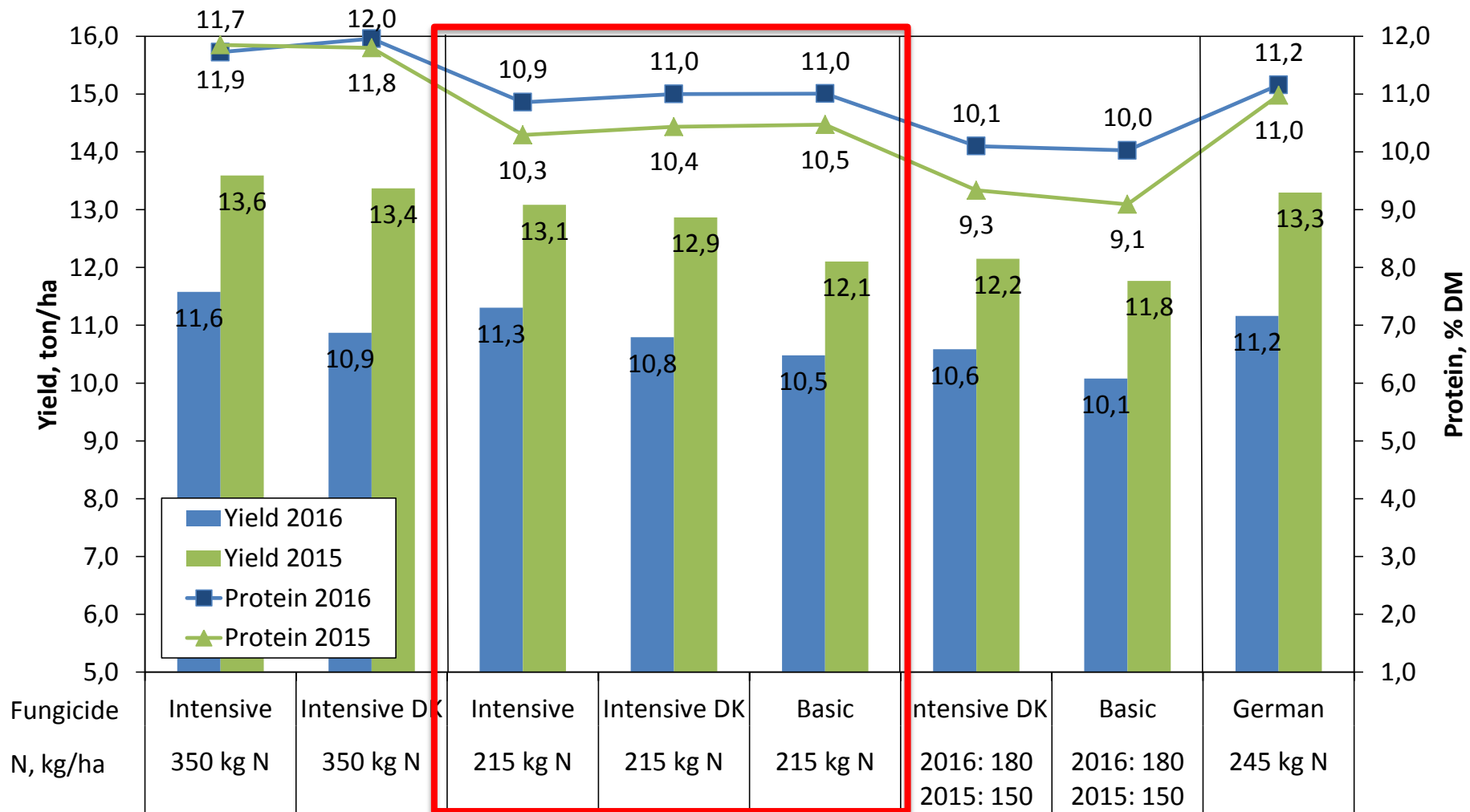
COST OF FUNGICIDE STRATEGIES, 2015 AND 2016

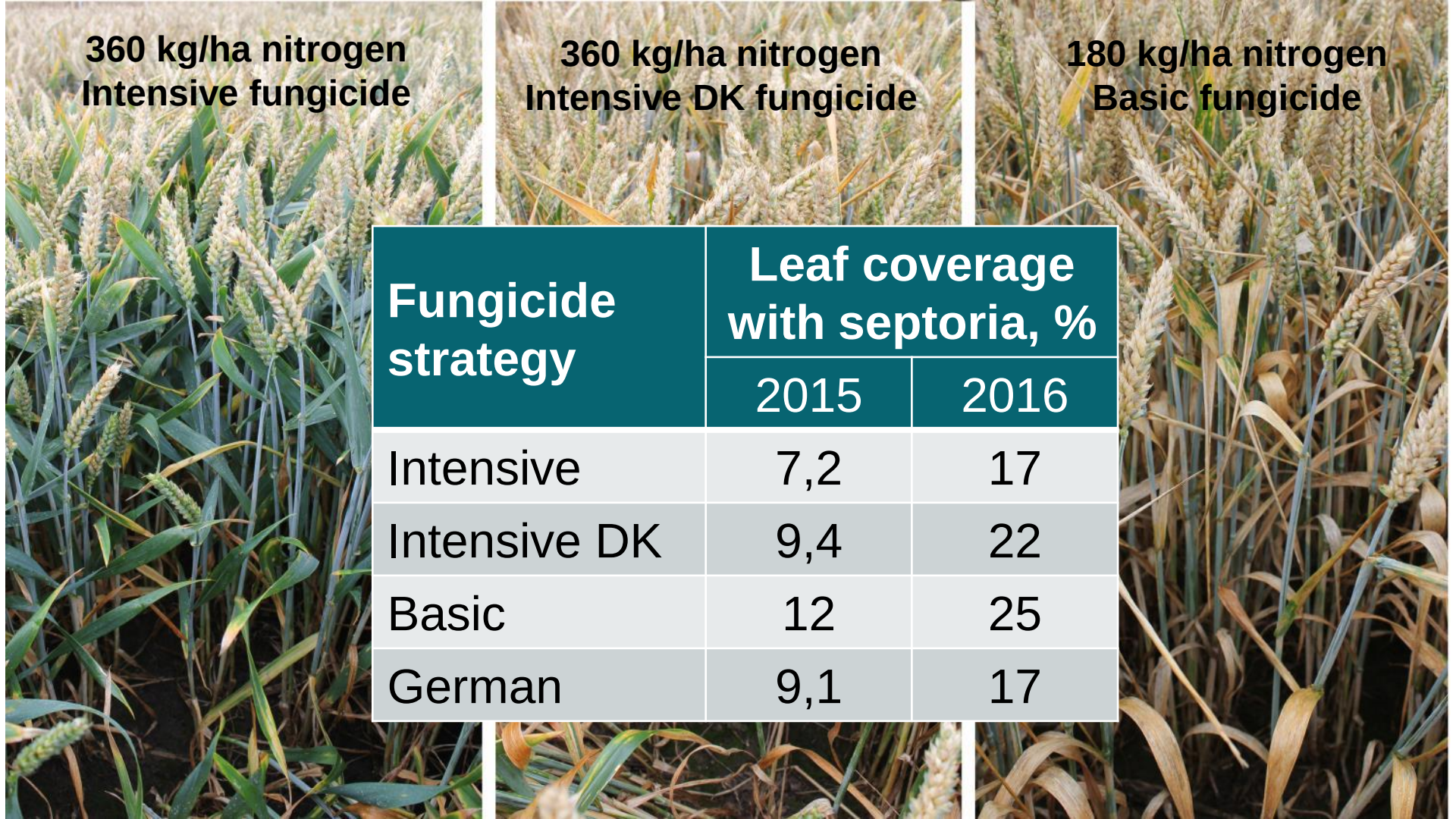
Strategy	Fungicide, Dkr/ha	Pesticide tax, Dkr/ha
Intensive	4.300	2.600
Intensive DK, 2015	1.740	630
Intensive DK, 2016	1.150	440
Basic	570	270
German	2.800	1.500

YIELD AND OUALITY 2015 AND 2016



YIELD AND QUALITY 2015 AND 2016





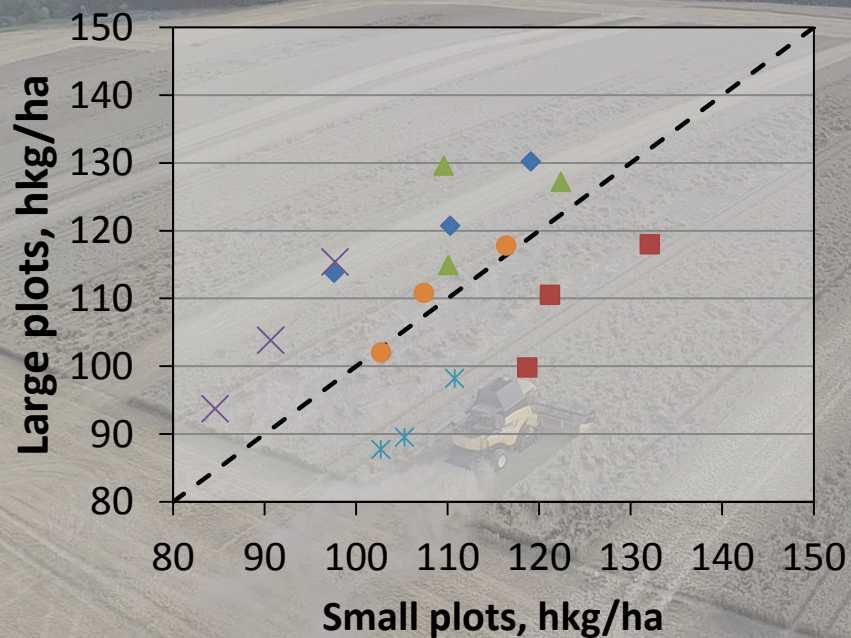
**360 kg/ha nitrogen
Intensive fungicide**

**360 kg/ha nitrogen
Intensive DK fungicide**

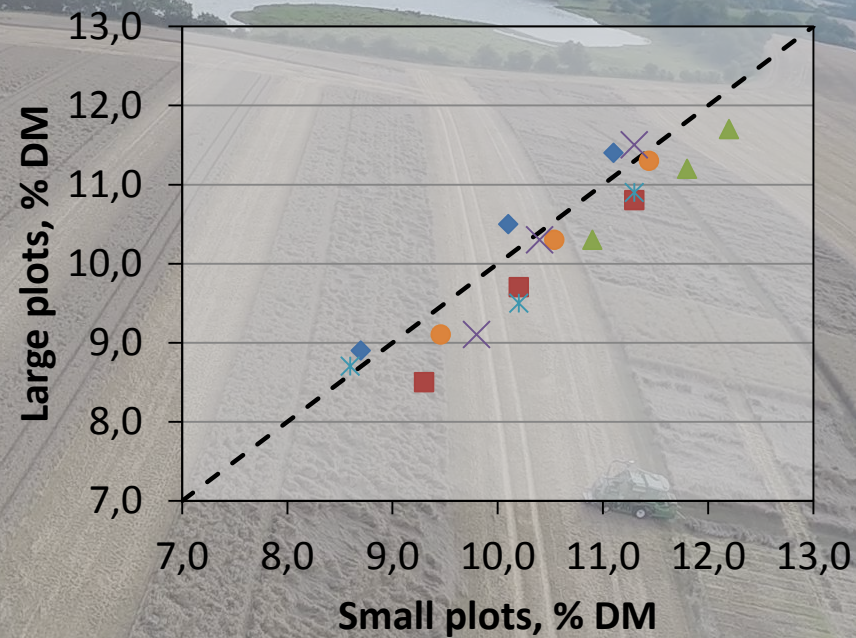
**180 kg/ha nitrogen
Basic fungicide**

Fungicide strategy	Leaf coverage with septoria, %	
	2015	2016
Intensive	7,2	17
Intensive DK	9,4	22
Basic	12	25
German	9,1	17

Yield



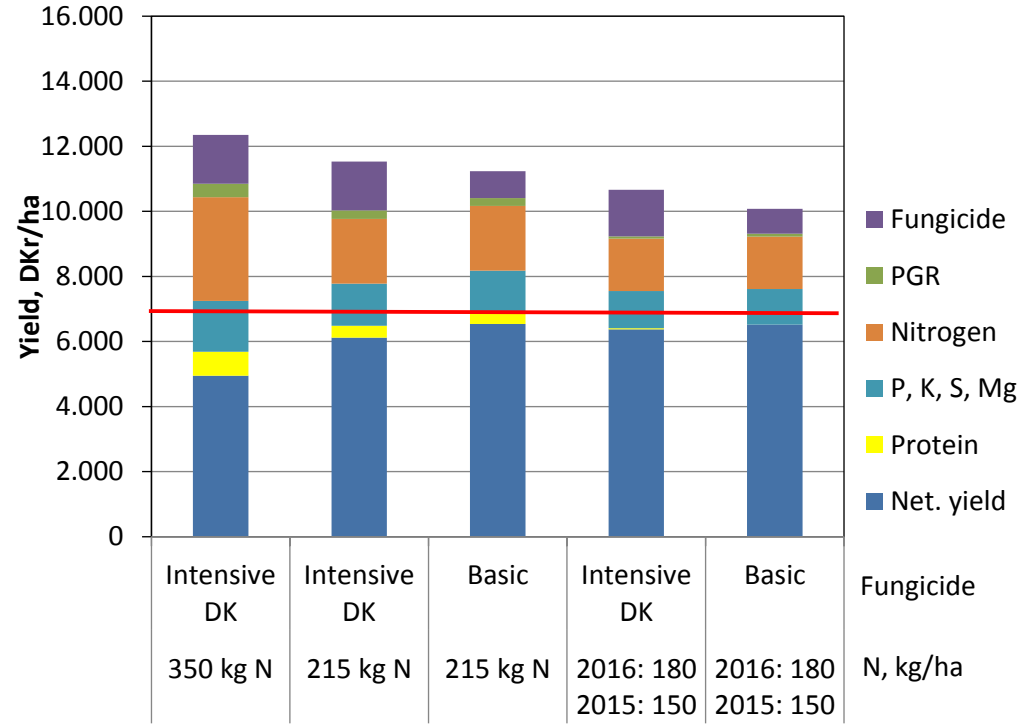
Protein



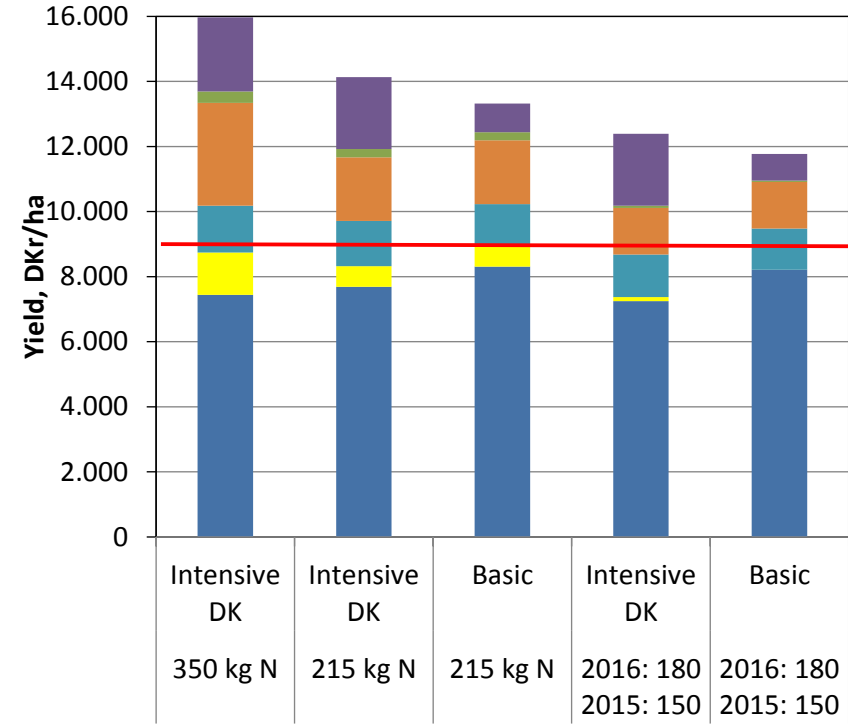
● Avg.
 ◆ Sjælland
 ■ Lolland
 ▲ Sønderjylland
 × Djursland
 ✱ Nordjylland

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 ◆ Sjælland
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 × Djursland
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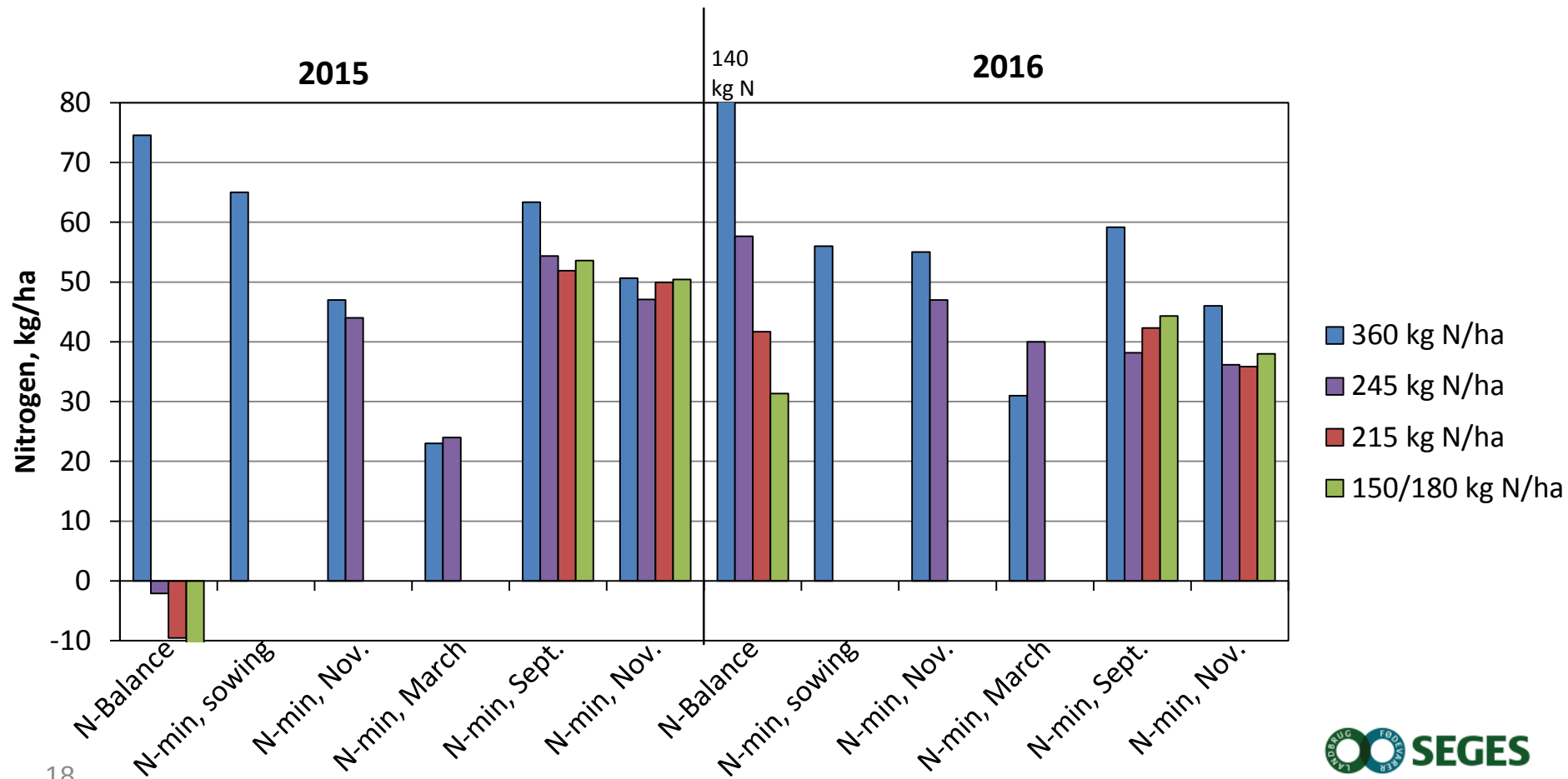
2016

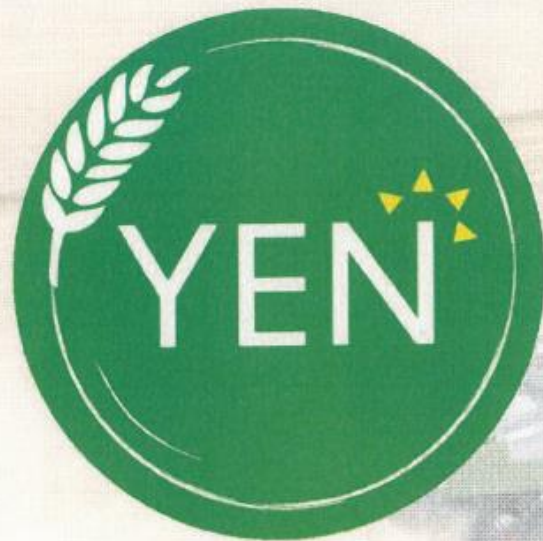


2015



N-BALANCE AND N-MIN 0-75 CM





2016

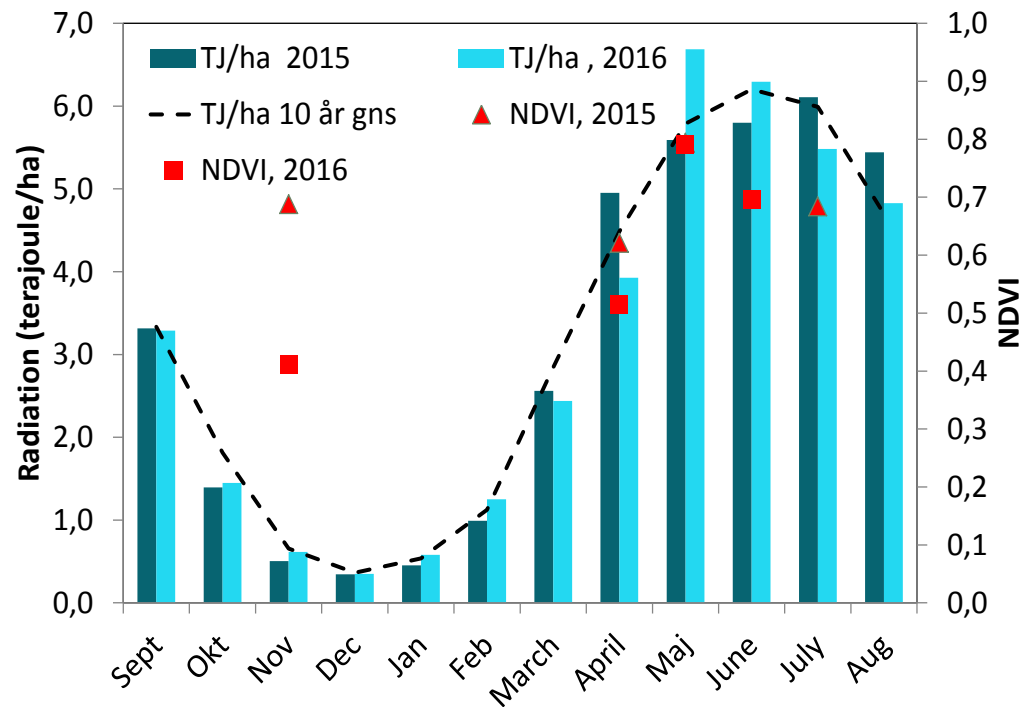
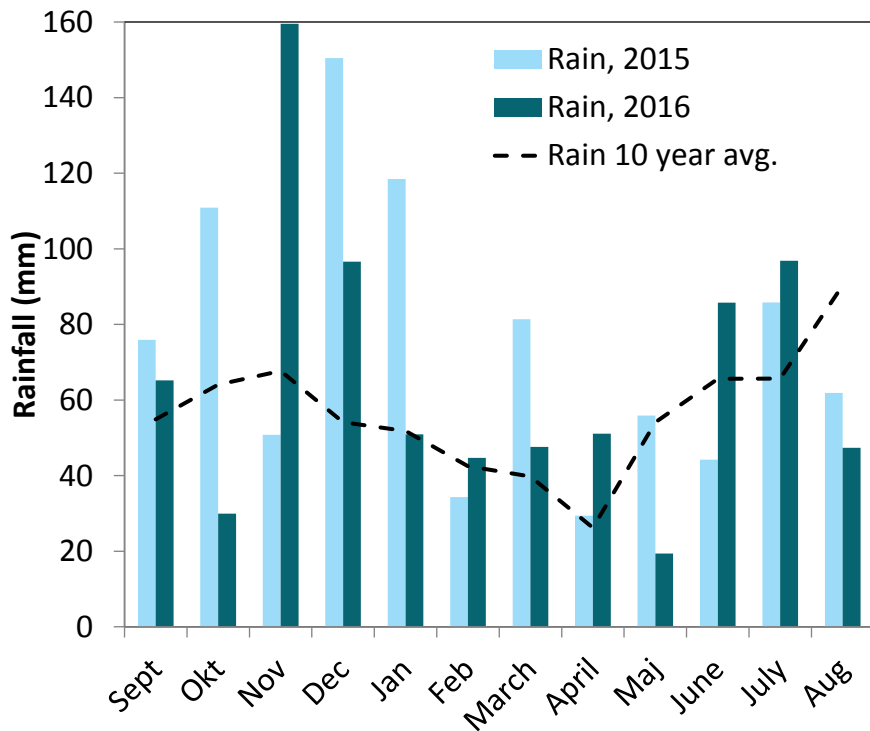
GOLD AWARD

**For a grain yield of 13.0 t/ha
in trial plots**

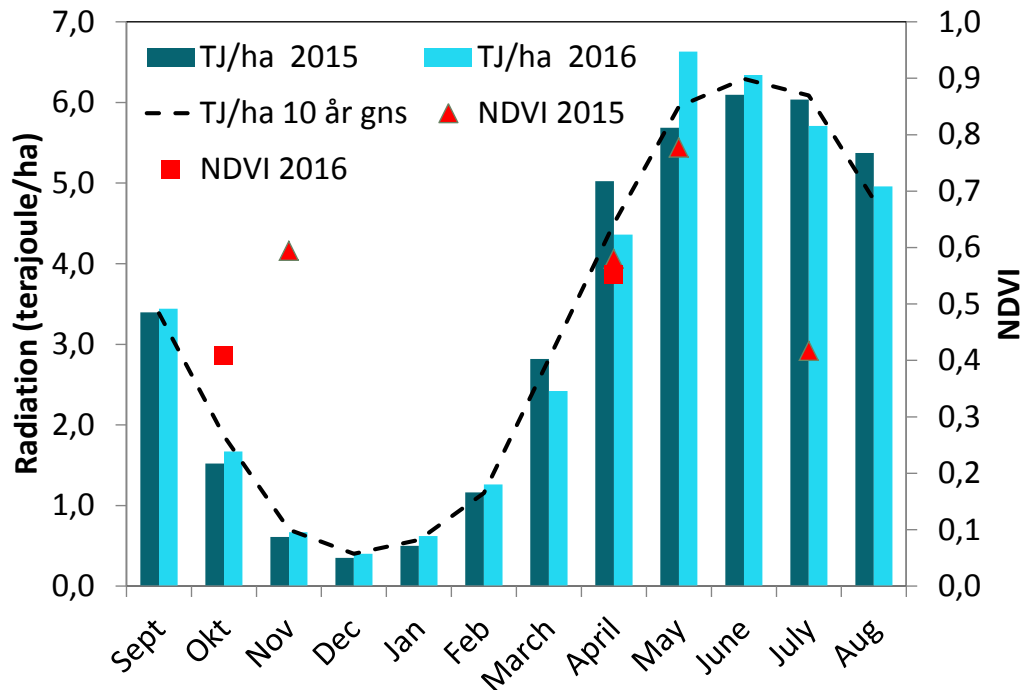
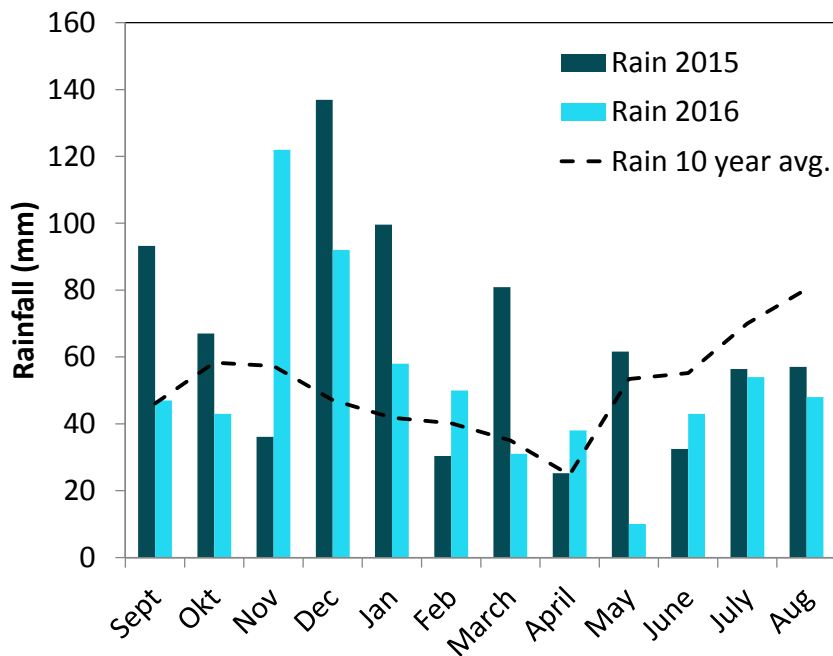
YIELD ENHANCEMENT NETWORK

	Pot. Yield, ton/ha		Actual yield, ton/ha		Biomass, ton/ha		Harvest index, %	
	2015	2016	2015	2016	2015	2016	2015	2016
Brønderslev	-	20,1	11,0	9,8	16,8	13,4	56	62
Holstebro	21,2	-	13,4	-	22,4	-	51	-
Djursland	-	21,0	11,2	11,5	-	17,5	-	56
Haderslev	22,3	22,4	15,0 	12,7 	25,7	19,1	50	57
Ringsted	22,6	21,2	14,8	13,0 	23,2	18,1	54	61
Lolland	23,0	20,0	14,8	11,8 	23,1	16,7	54	60

RINGSTED



LOLLAND



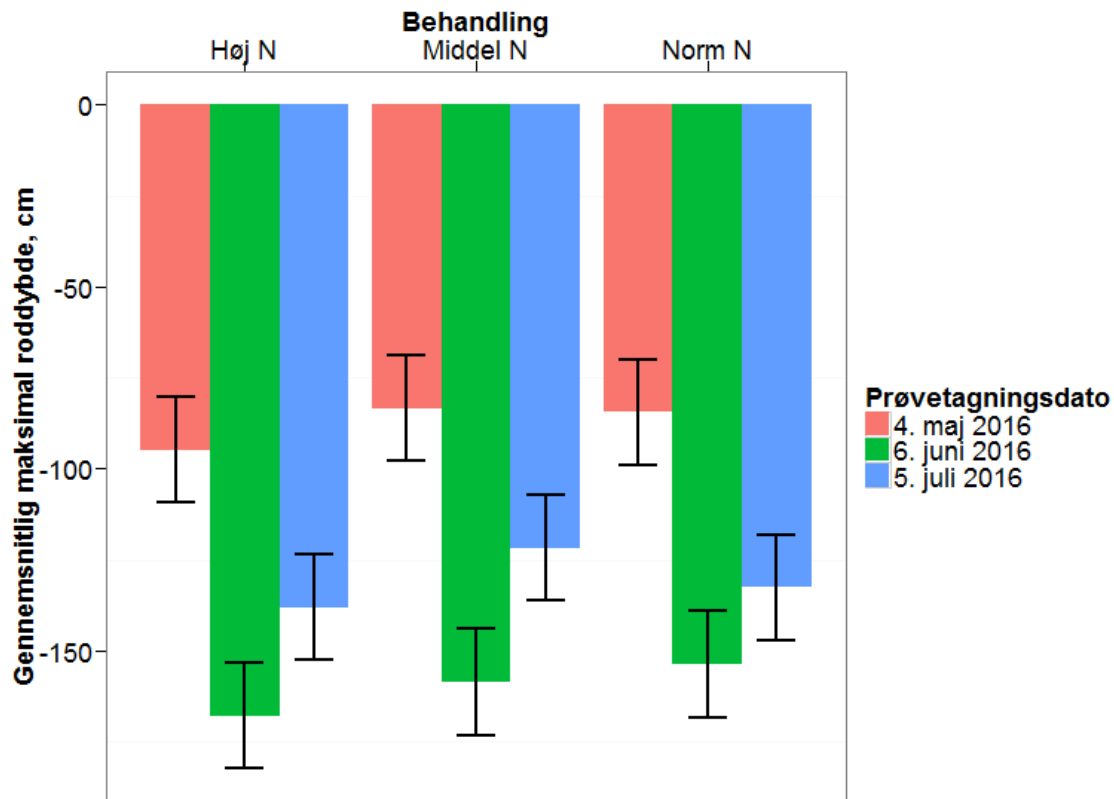


Gefion, Ringsted

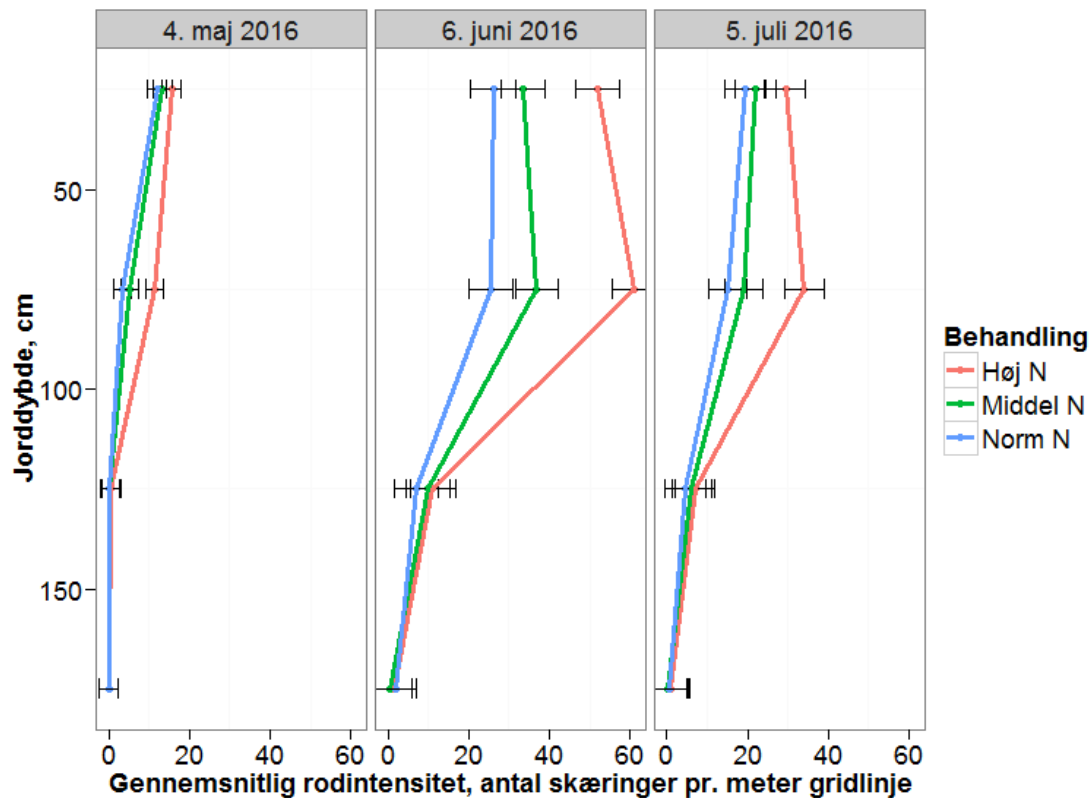
ROOT MEASUREMENTS IN THE FIELD



ROOT DEPTH, RINGSTED



ROOT INTENSITY, RINGSTED



CONCLUSION

- The potential yield in Denmark is:
 - considerable higher than what is commonly achieved,
 - comparable to UK
- Value of protein in feed wheat is significant
- Climate often more important than small adjustments in nitrogen and fungicide strategy
- Up to 250 kg of N/ha, with out an increase in mineral N left in soil