

Higher fertiliser value by slurry injection after ploughing

Session: Measurement of fertiliser value of organic fertilisers



Foto: Anker Vestergaard



Foto: Peter Sørensen

Professor Peter Sørensen,
Department of Agroecology, Aarhus University

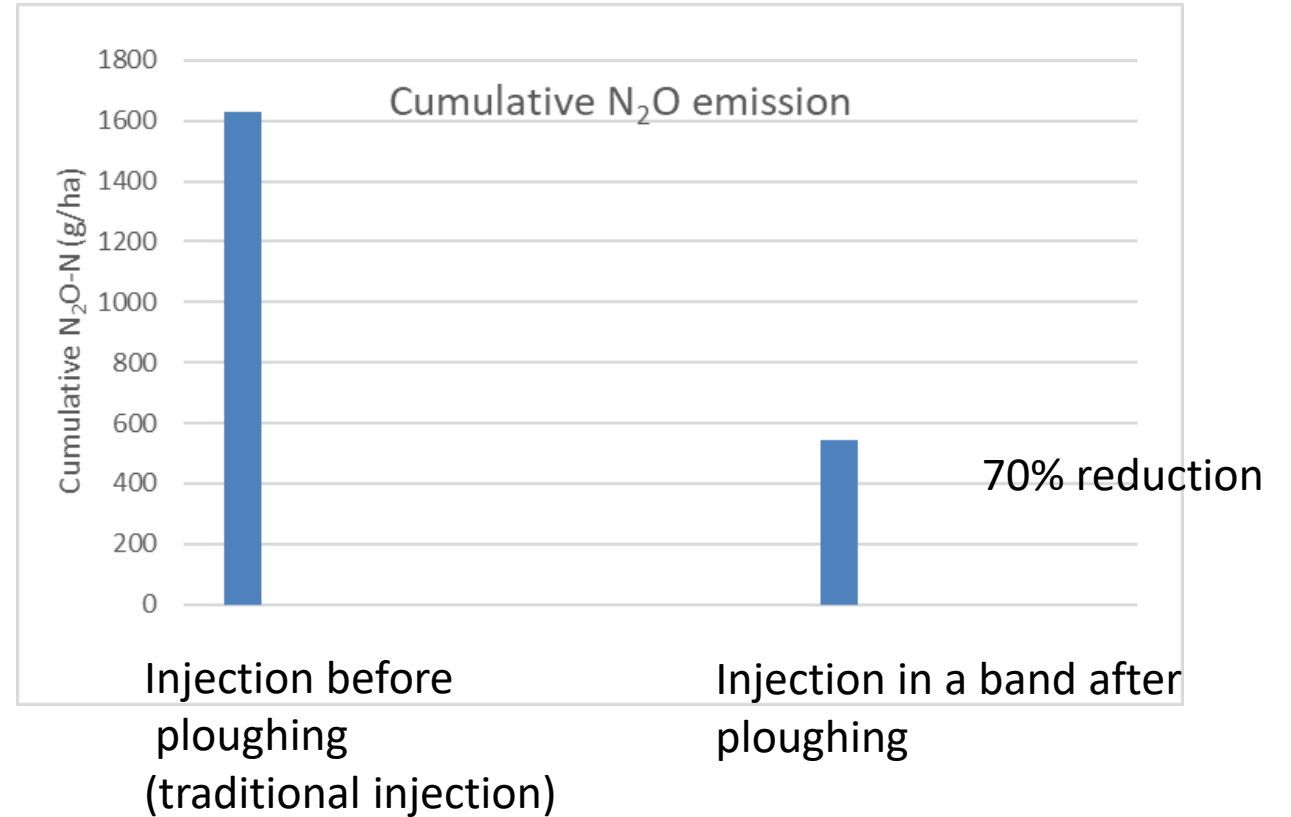
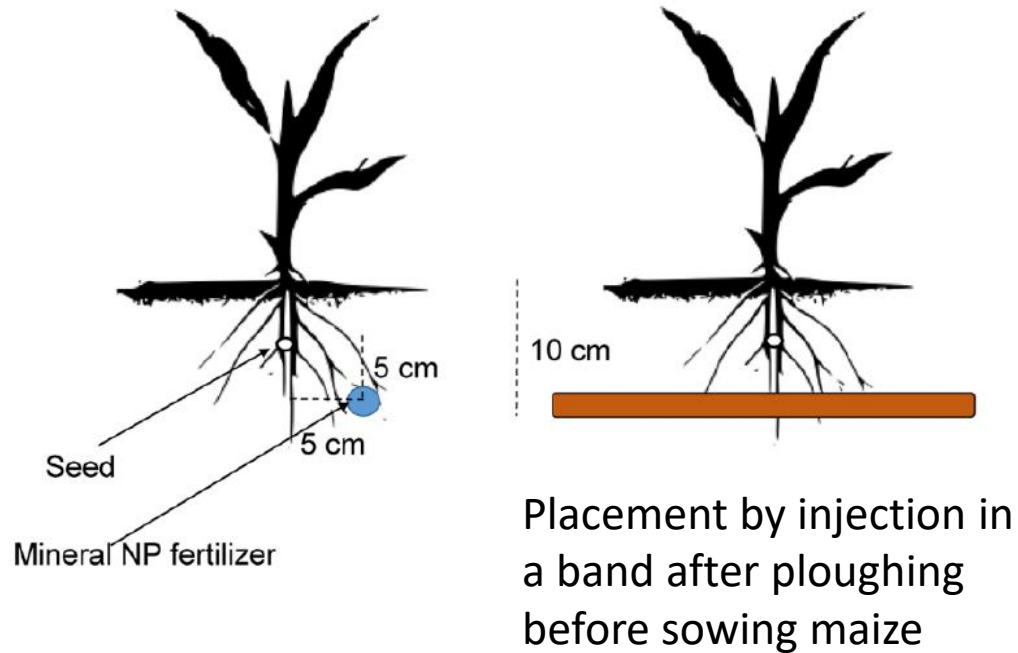
Intro

- Practice: Slurry is injected before ploughing.
- Most experiments: Slurry is injected after ploughing, when testing the fertiliser value.
- Effects on fertiliser value!
- Maybe some farmers could benefit from injection after ploughing?

Injection before ploughing



Lower nitrous oxide by slurry placement in maize by injection after ploughing



Soil type: JB4
194 kg total N/ha in cattle slurry + 27 kg min N/ha
Only one experiment!

Treatments in field experiments with spring barley

2 years experiments at JB4 soil

1. Slurry injection before ploughing
2. Slurry injection after ploughing
3. Mineral N (variable rates, no placement)

Experimental injector used both before and after ploughing



24 cm tine distance

Mineral fertilizer application

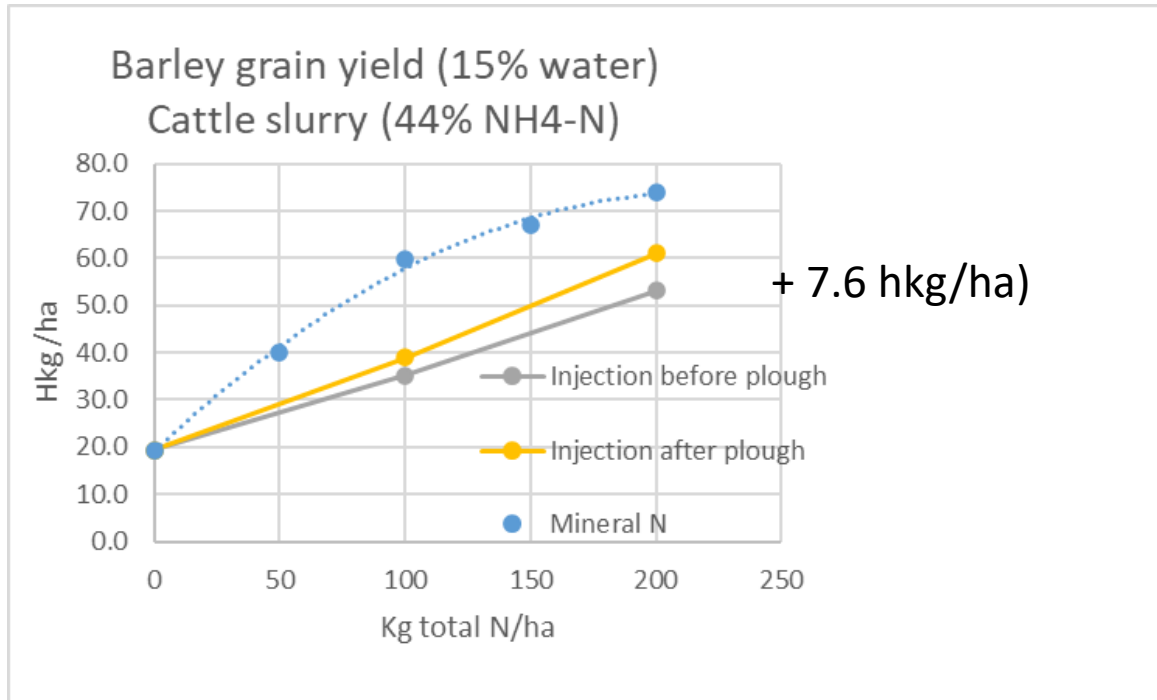


Barley, injection before ploughing (conv)

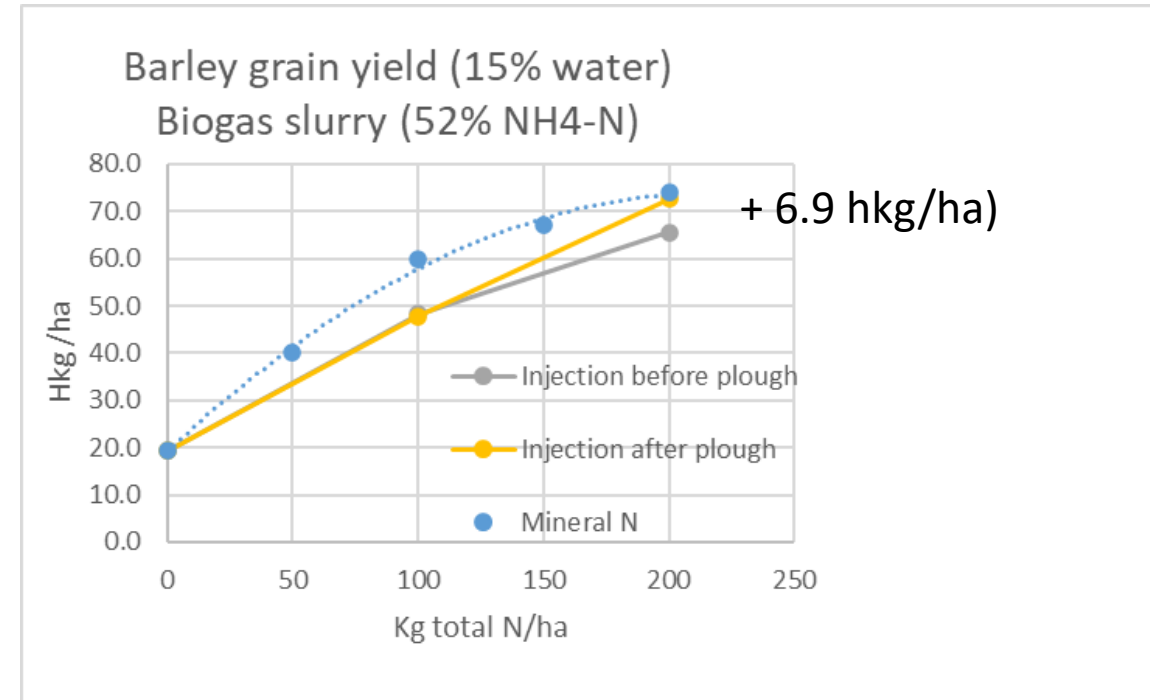
Barley, injection after ploughing (conv)

Higher barley yields by injection after ploughing

2022 experiment

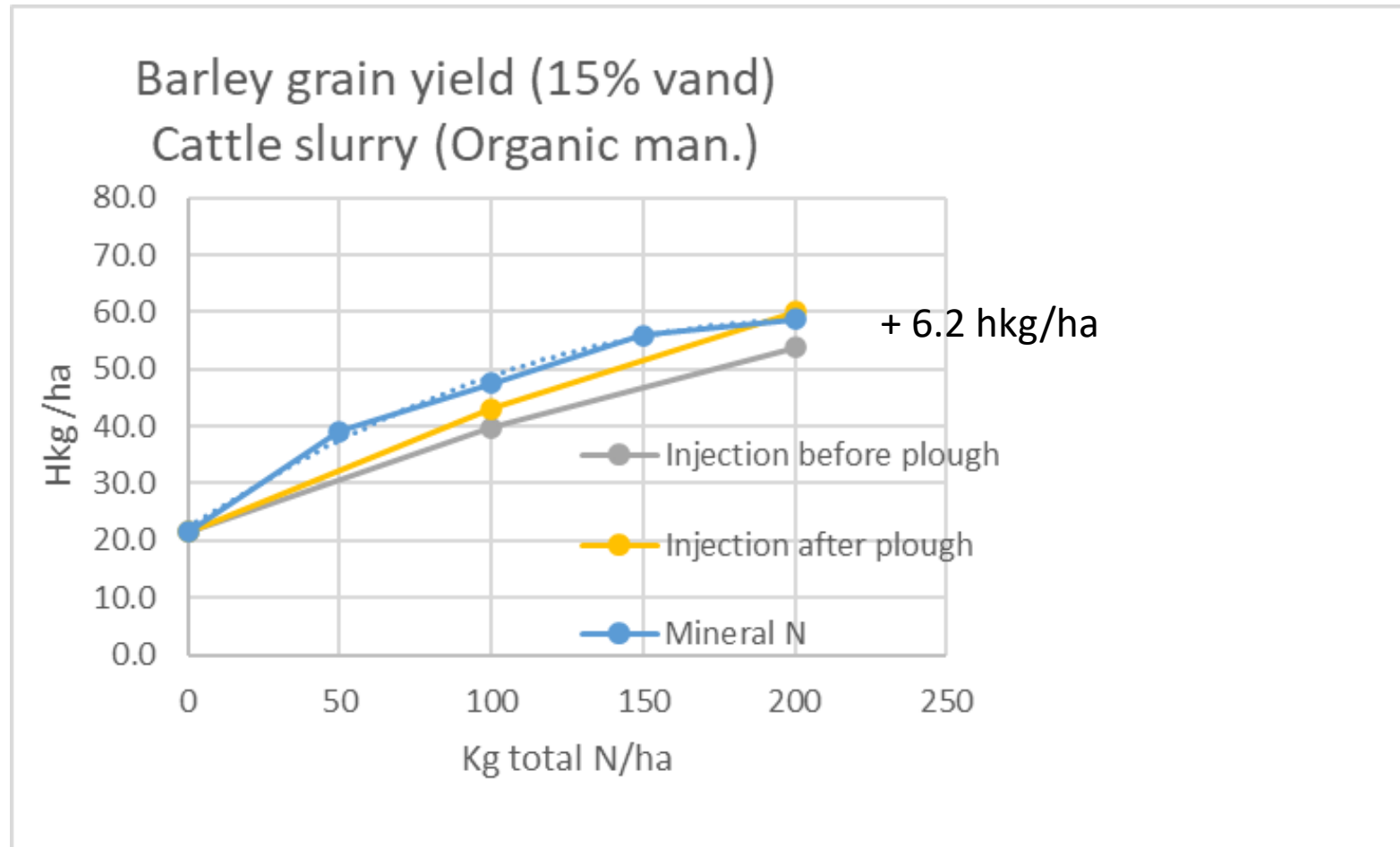


200 kg total N/ha in cattle slurry:
66 ton/ha
88 kg NH₄-N/ha



200 kg total N/ha in biogas slurry:
54 ton/ha
104 kg NH₄-N/ha

Similar benefits of injection by organic management of spring barley 2022



Organic crop management:

- 24 cm row distance
- Hoeing (radrenset)
- No pesticides
- Low perenial weeds
- JB4



Barley with Organic management

Similar effect in 2021: + 7 hkg grain /ha by injection after ploughing
(by 100 kg total N/ha in cattle slurry)

Organic barley with slurry injected before and after ploughing

Slurry injection before ploughing
(inhomogeneous crop)



Slurry injection after ploughing

N fertiliser replacement values (værdital) by injection before and after ploughing (2022)

Based on barley grain N uptake

Manure	N fertiliser replacement value (% of total N)	
	Injection before	Injection after
Cattle slurry 100 kg N/ha	33	42 (+9)
Cattle slurry 200 kg N/ha	42	50 (+8)
Biogas slurry 100 kg N/ha	57	59 (+2)
Biogas slurry 200 kg N/ha	58	67 (+9)



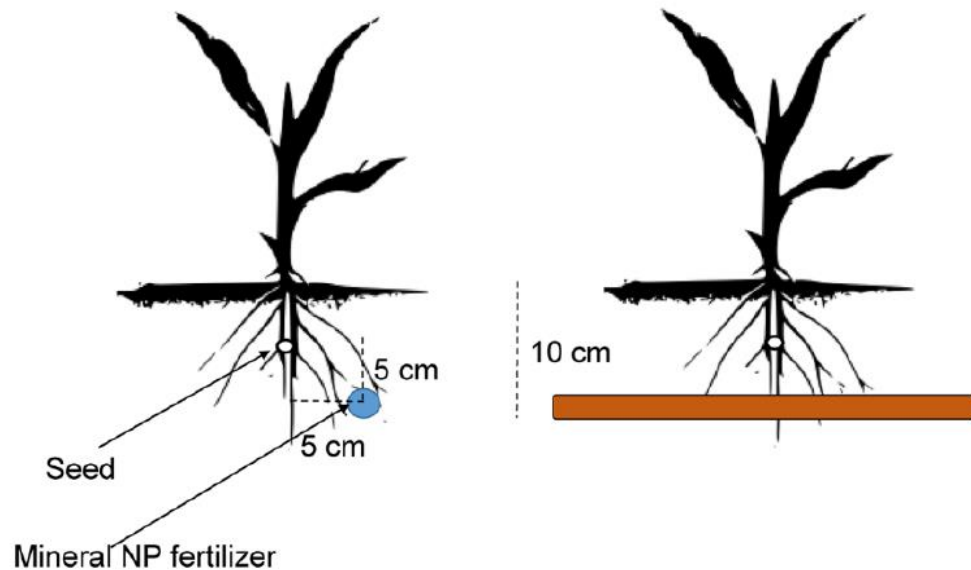
Foto: Peter Sørensen



Foto: Anker Vestergaard

Why positive effects of slurry placement after ploughing?

- Placement effect. Good starter effect.
- Less Immobilisation of ammonium-N in slurry (less microbial binding of N)
- In organic farming: Less competition from weeds (ukrudt)



Practical problems by injection after ploughing

- Special injectors needed (“dog walk”)
- Probably only possible on sandy soils
- Dry weather and soil
- Wheel tracks /soil compression?
- Sowing (uneven surface)?
- Systems with reduced tillage/no ploughing?



N fertiliser value of slurry applied to spring barley by incorporation (harrow) vs injection

N Fertiliser value (værdital) estimated from N uptake in barley grain + straw.

Manure	N fertiliser replacement value (% of total N)	
	Trailing hose and incorporation by rotary harrow	Direct Injection
Cattle slurry, 100 kg NH ₄ -N/ha	41	68
Pig slurry, 100 kg NH ₄ -N/ha	63	79

Average of 3 years experiments at Askov Forsøgsstation.

(Grøn Viden no 281)

Conclusions

- Injection after ploughing: Extra yields of 6-7 hkg barley/ha (by 54-66 ton/ha) – no wheel tracks in experiment!
- Negative effect of wheel tracks?
- Larger effects at high slurry dosage.
- Lower Green house gas emission by slurry placement (N_2O)?
- Higher fertilizer value of slurry in experiments than in practice?



Thank you for your attention

The ClimOptic project was supported by ICROFS/OrganicRDD4



Foto: Anker Vestergaard