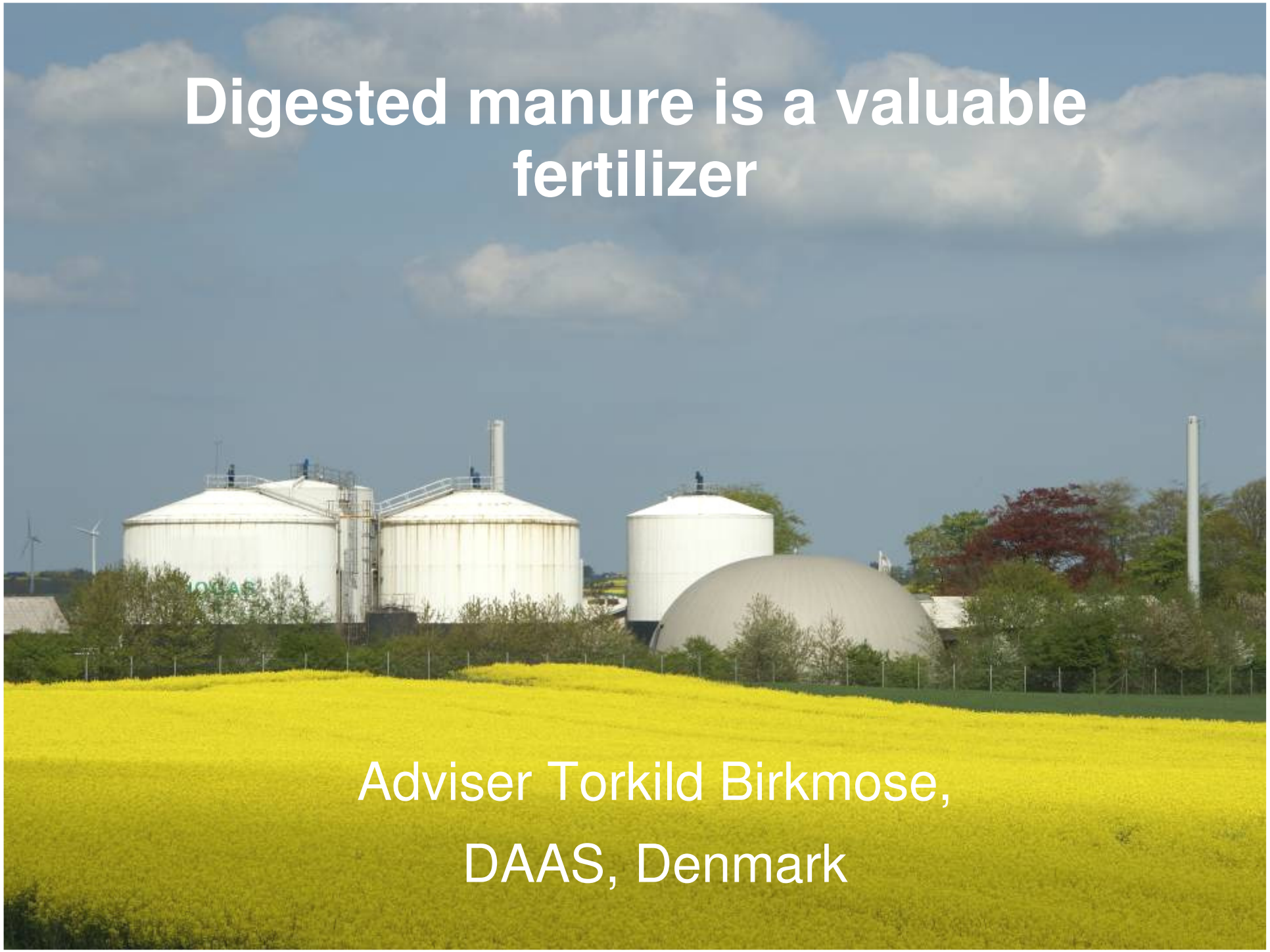
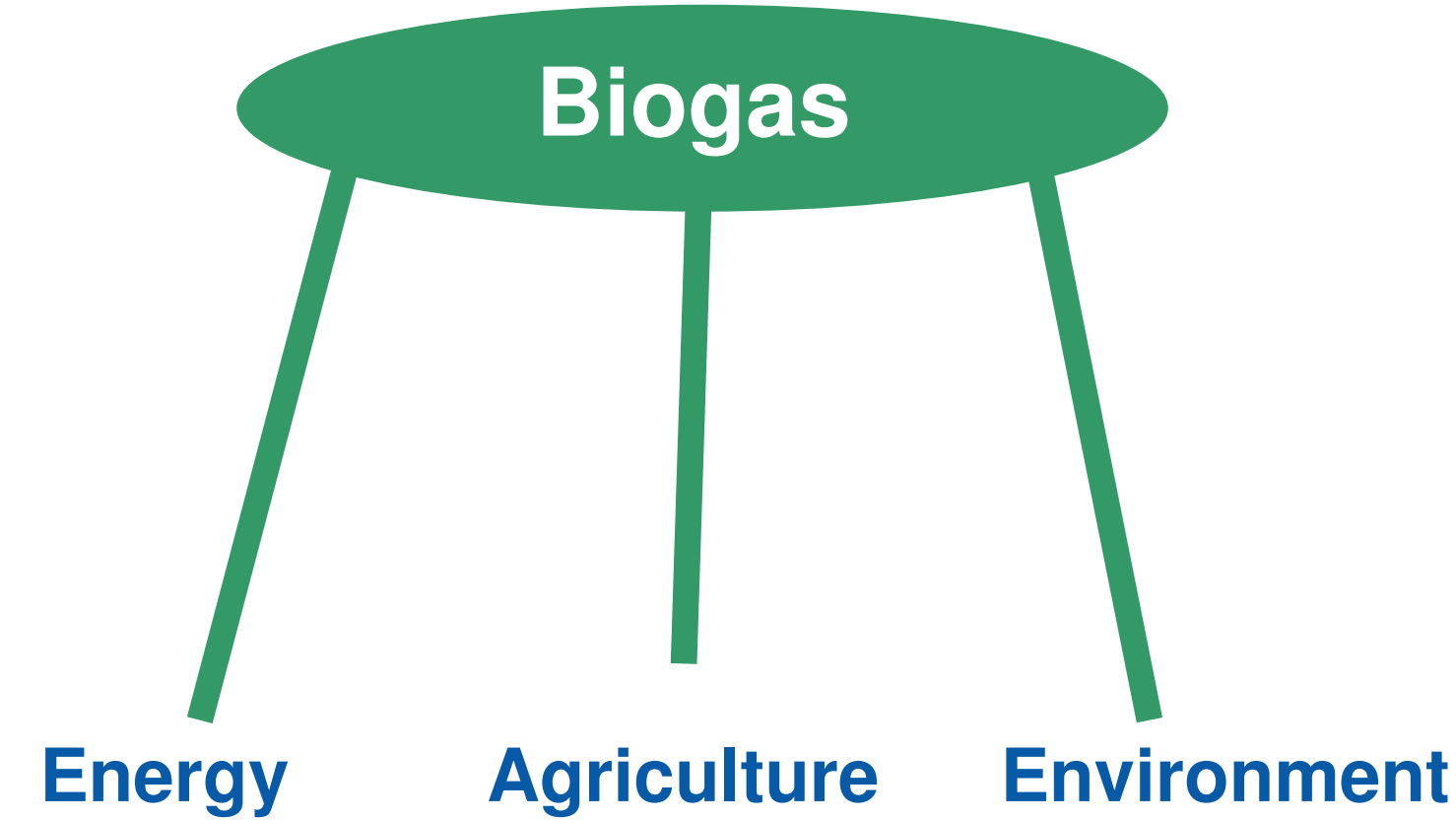
Digested manure is a valuable fertilizer



Adviser Torkild Birkmose,

DAAS, Denmark

Biogas rests on tree legs



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Agricultural advantages

- Improved fertilizer value of nitrogen
- Balanced P and K-balance in slurry
- Homogeneous and light fluid
- Free from germs and seeds
- Reduced costs for transportation of slurry

Environmental advantages

- Reduced nitrate leaching
- Reduced odour problems
- Reduced green house gas emission
- Controlled recycling of organic waste

Mixing and digesting slurry change the characteristic of the slurry

	DM, %	N-tot, kg/t	NH_4-N, kg/t	P, kg/t	K, kg/t	pH	NH_4-N, %
Digested slurry	4.8	4.4	3.5	1.0	2.3	7.6	81
Pig slurry	5.0	4.8	2.9	1.1	2.3	7.1	74
Cattle slurry	7.5	3.9	2.4	0.9	3.5	6.9	61

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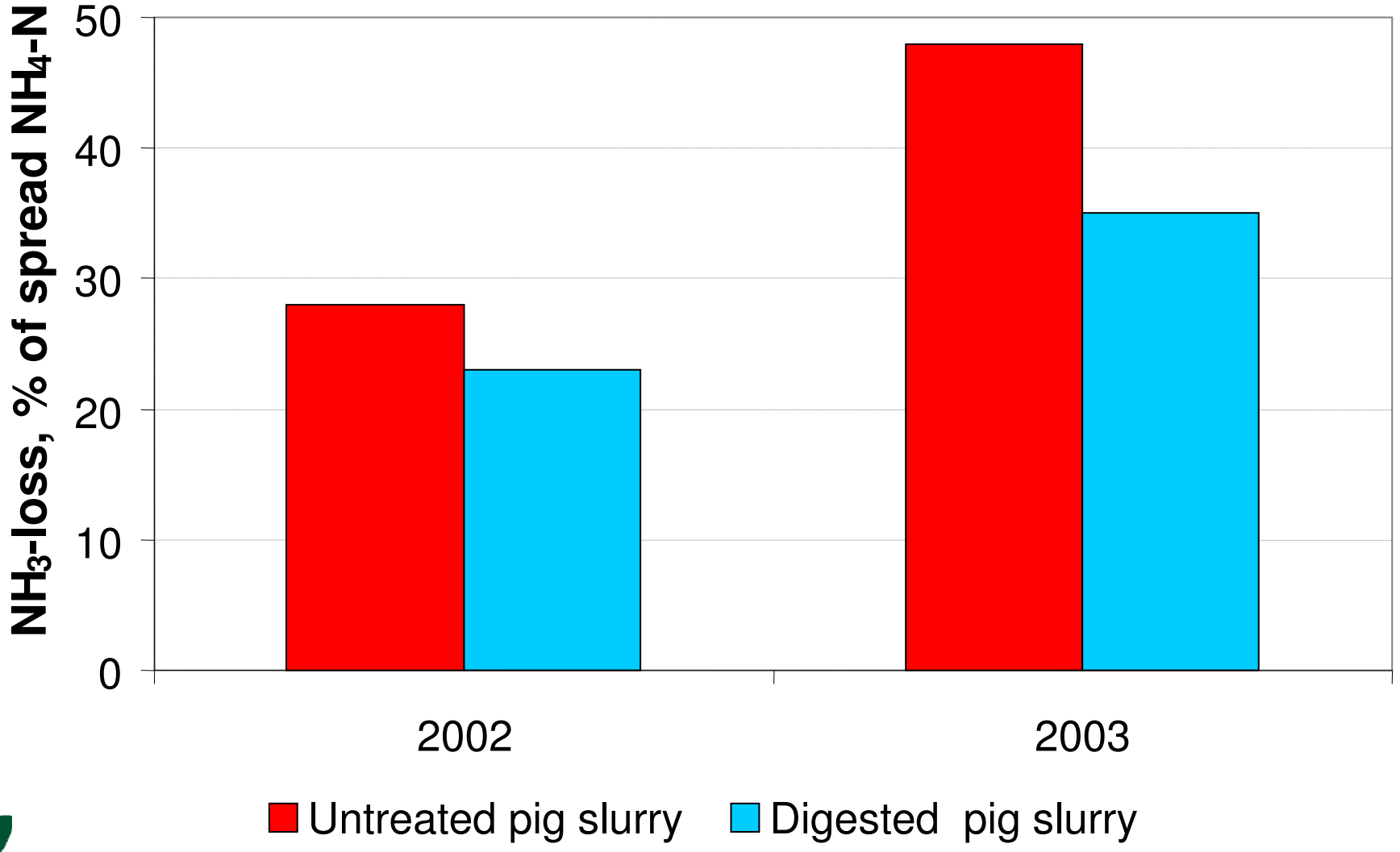
Fertilizer value

Four contributions to better fertilizer value

1. Lower ammonia volatilization due to faster absorption in the soil
2. Increased availability of nitrogen due to mineralization of organic bound nitrogen
3. Better balance between requirement of P and K and the application of P and K
4. Organic waste is added to the manure

Ammonia volatilization in spring barley



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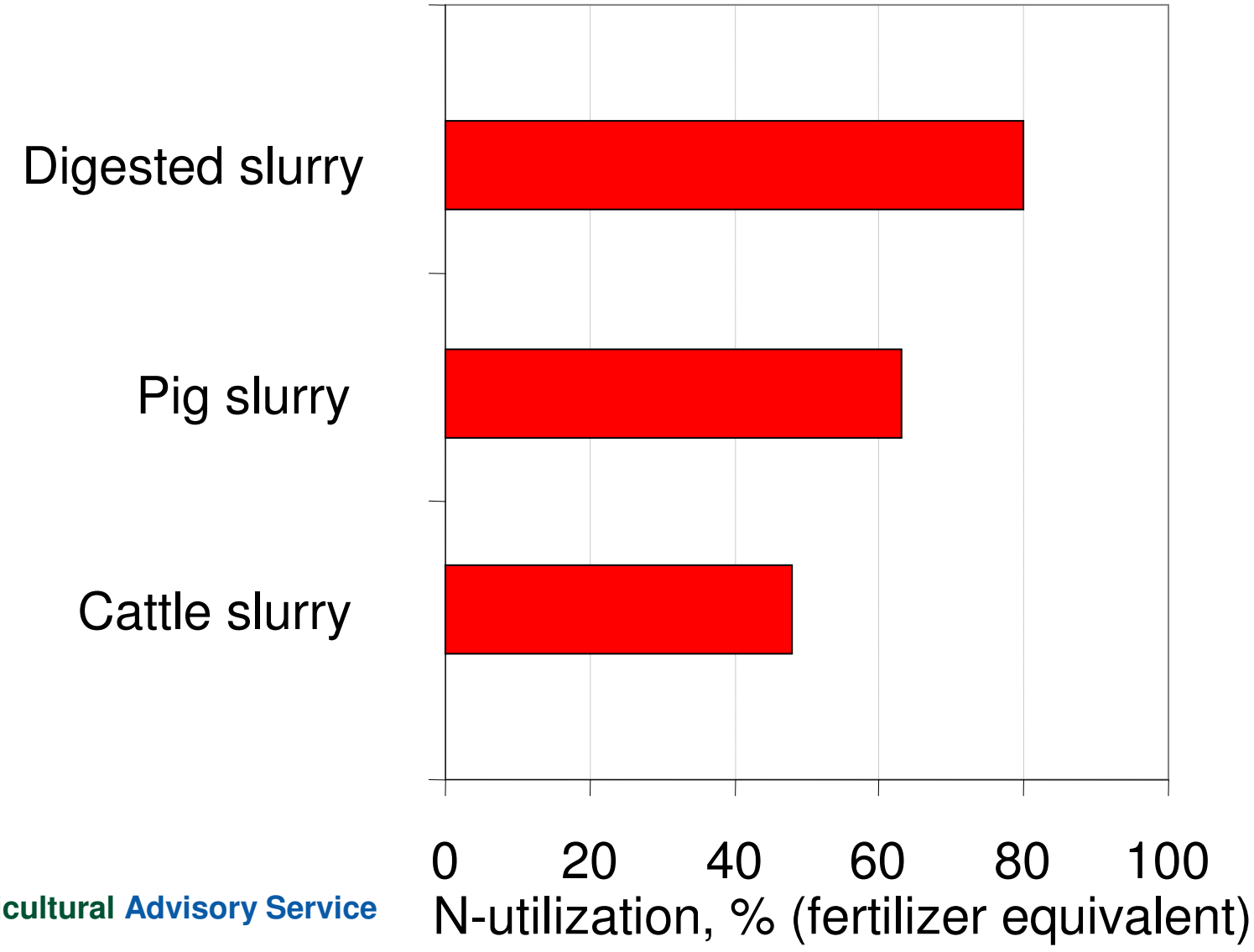
Source: Grøn Viden no. 296, DIAS

Improved fertilizer effect of nitrogen - trials in winter wheat



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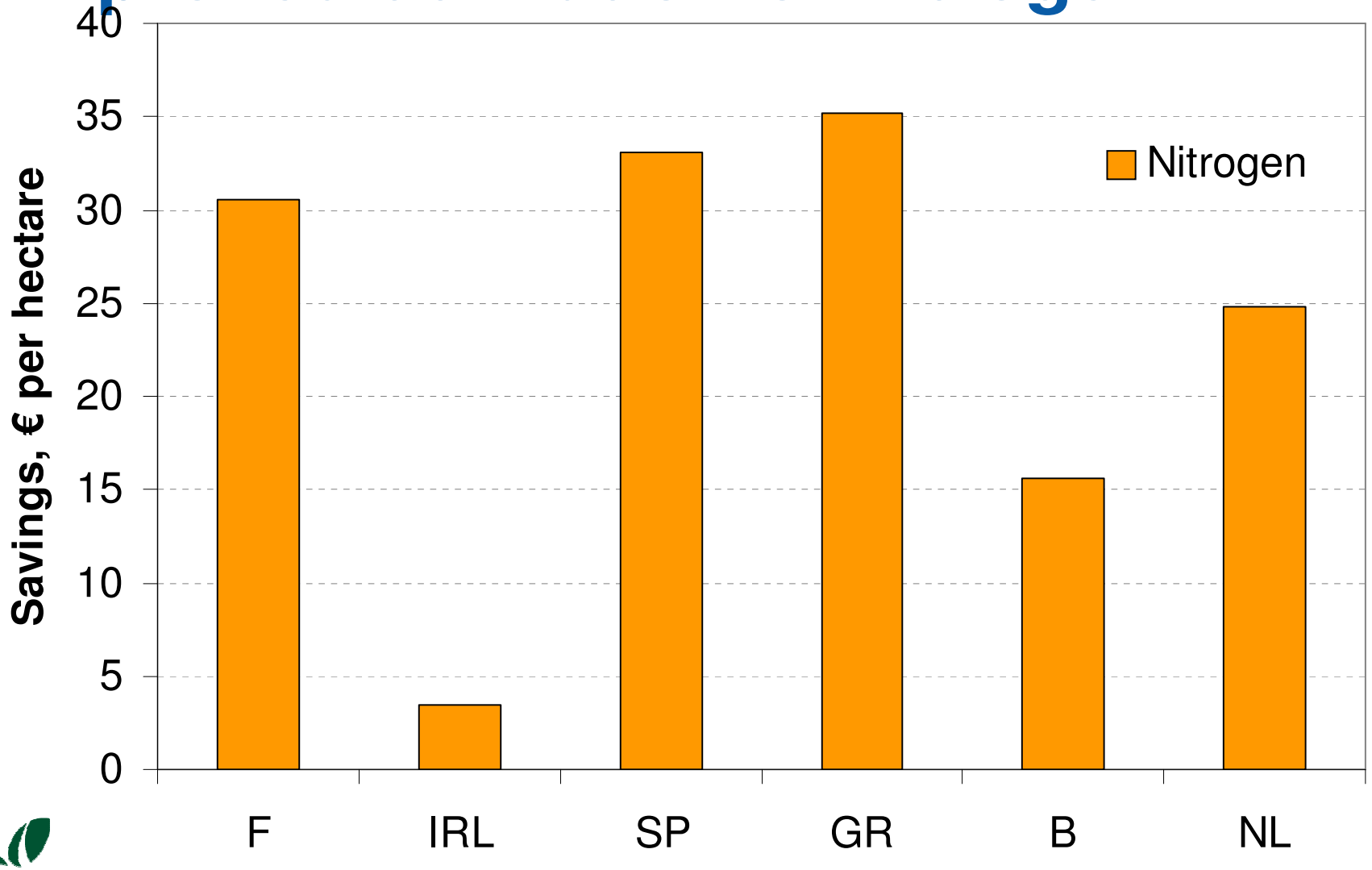
Source: DAAS

Fertilizer plan for nitrogen for 1 ha grass

Per hectare	Cattle slurry	Digested slurry
N-requirement, kg	250	250
N in slurry, kg total	170	170
N-utilization, %	40	60
N- in slurry, utilized, kg	68	102
Mineral fertilizer	182	148
Saved, kg per ha	-	34
Saved, € per ha	-	23

PROBIOGAS: Savings due to improved utilization of nitrogen



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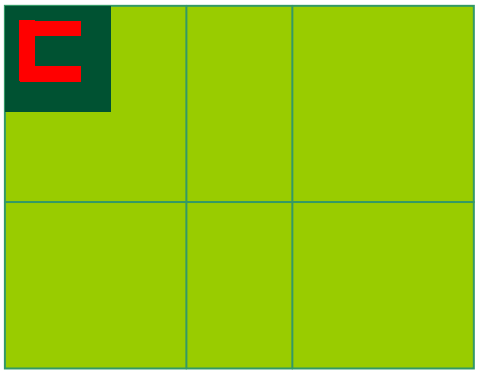
P and K-utilization – an example

Dairy farm



P-requirement: 20 kg P/ha
P-application: 40 kg P/ha
P-utilization: 50 percent
P i mineral fertilizer: 0 €/ha

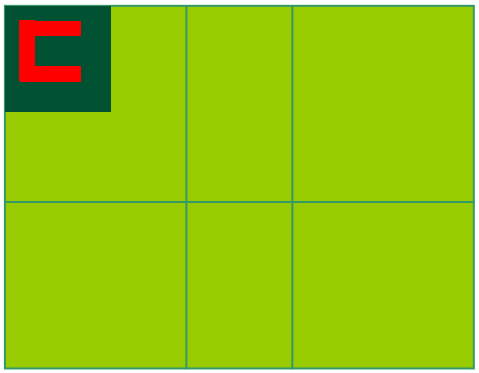
No manure!

Plant producer

P-requirement: 20 kg P/ha
P in manure: 0 kg P/ha
P-utilization: -
P i mineral fertilizer: 22 €/ha

P and K-utilization – an example

Dairy farm



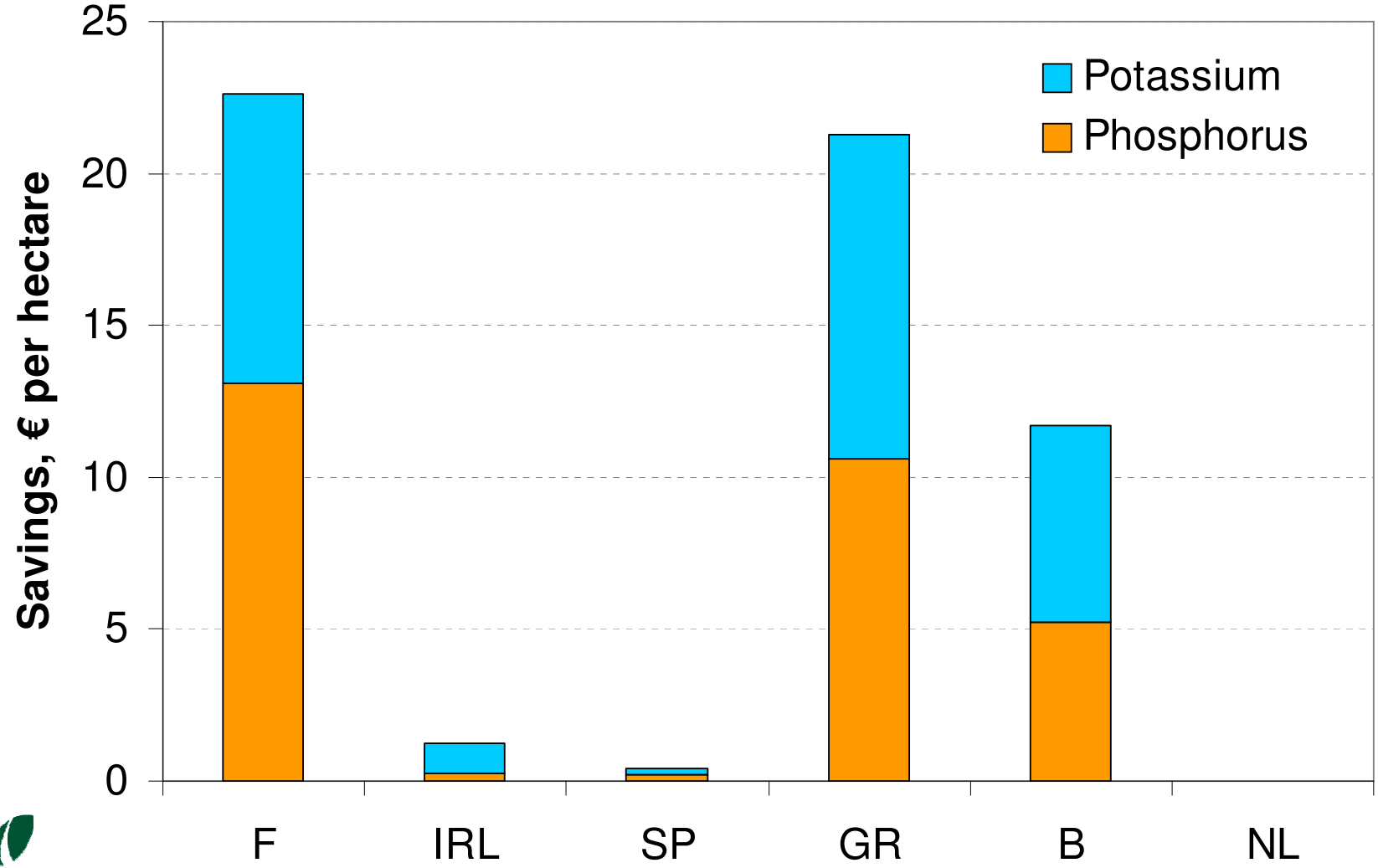
Share manure!

Plant producer

P-requirement: 20 kg P/ha
P-application: 20 kg P/ha
P-utilization: 100 percent
P i mineral fertilizer: 0 €/ha

P-requirement: 20 kg P/ha
P in manure: 20 kg P/ha
P-utilization: 100 percent
P i mineral fertilizer: 0 €/ha

PROBIOGAS: Savings due to improved utilization of phosphorus and potassium



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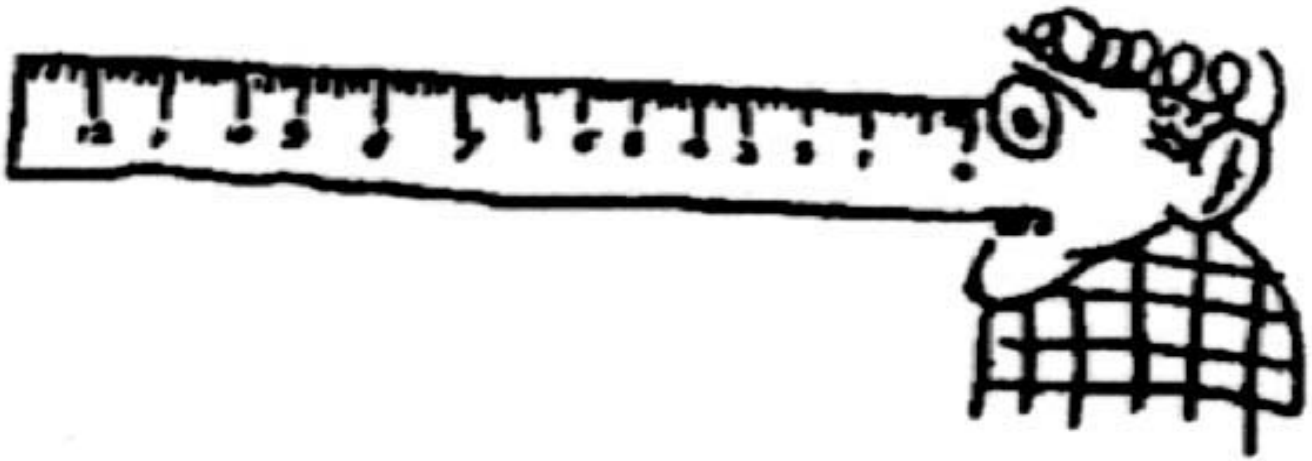
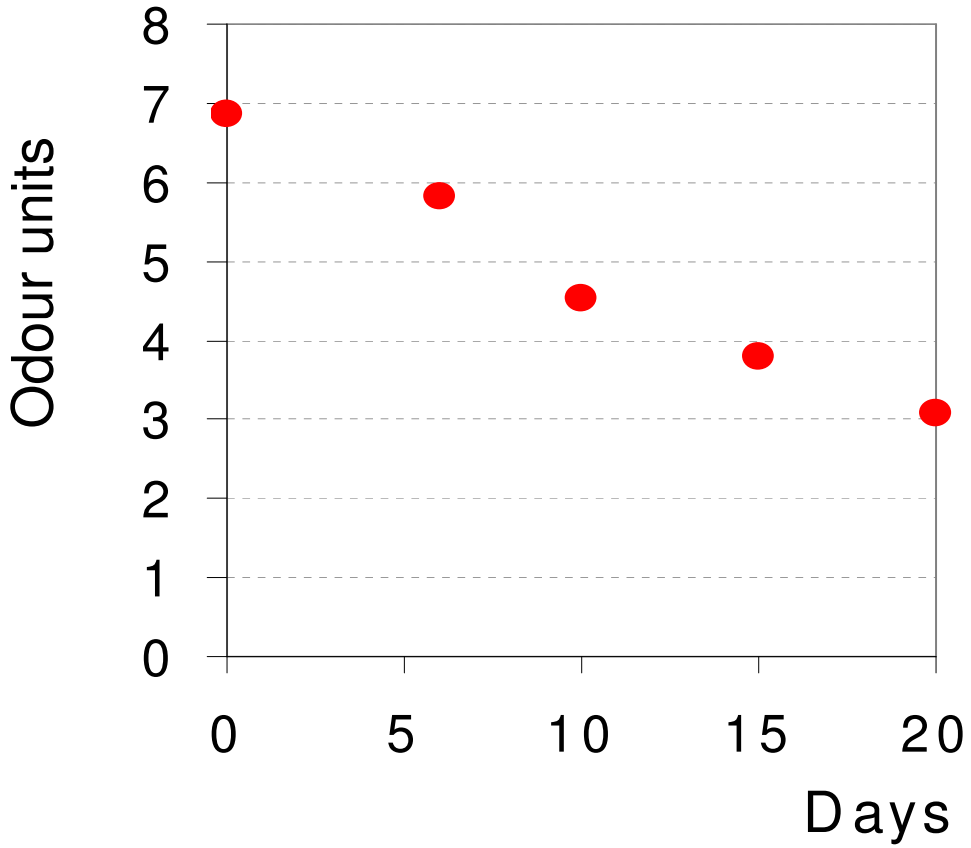
Digestion reduces odour



Reduction of odour compounds in the biogas reactor



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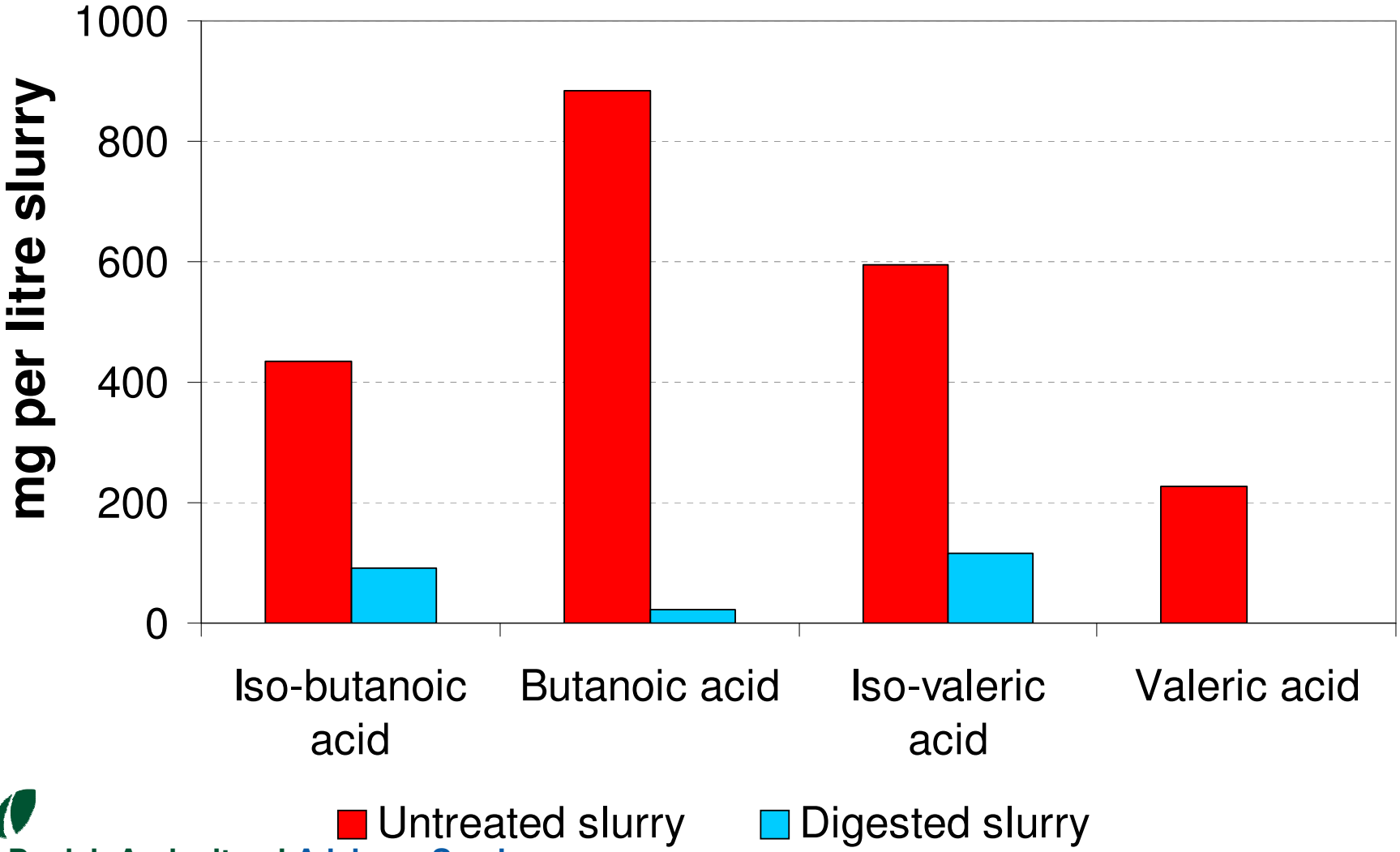
Source: Powers *et al.*, 1999

Concentration of VFA in slurry



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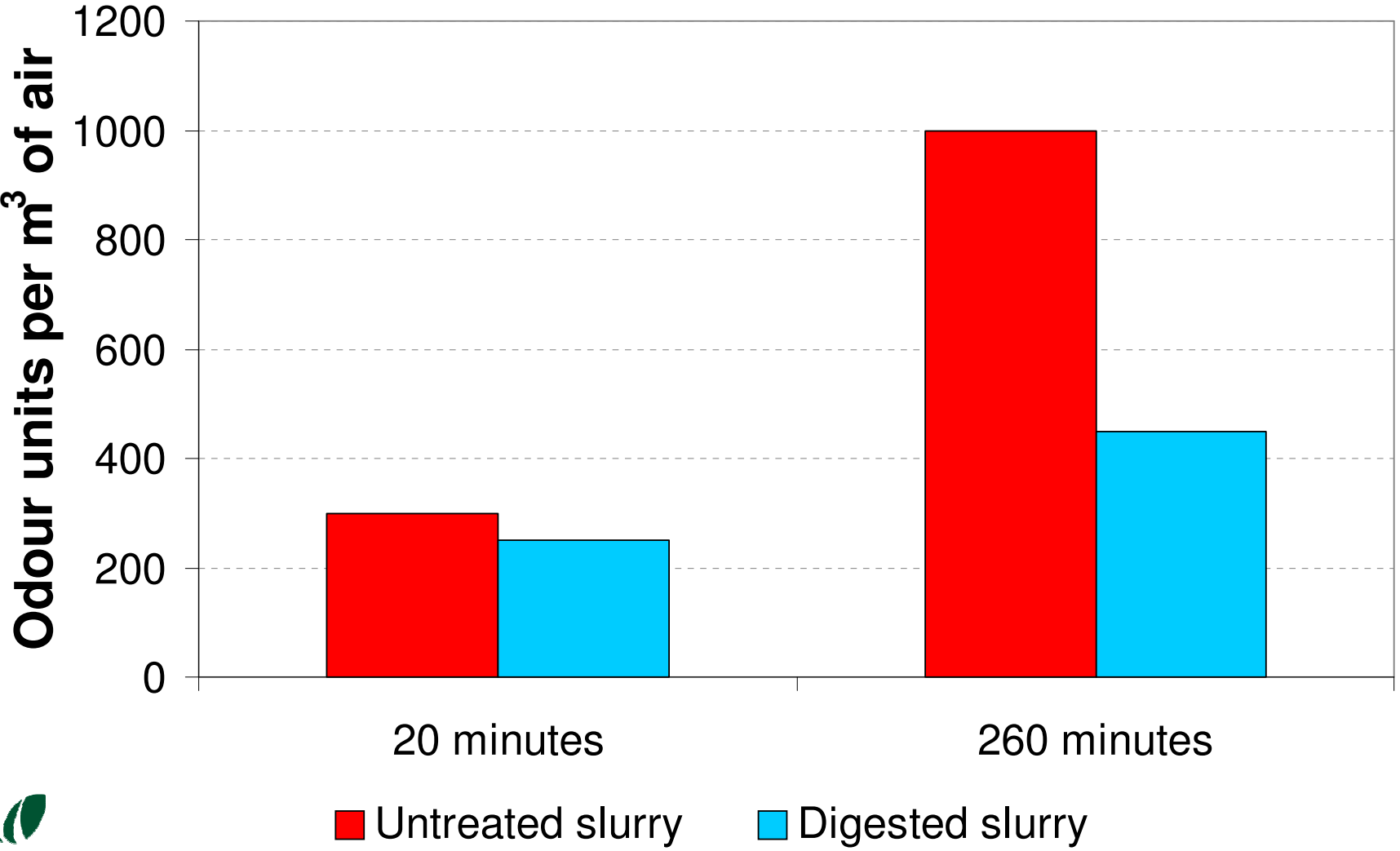
Source: Grøn Viden no. 296, DIAS

Carcass chamber for collecting air samples

Odour concentration in air samples after spreading



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Source: Grøn Viden no. 296, DIAS

Why don’t we have more biogas plants in Denmark?

- Poor preconditions – low price on electricity results in a poor economy
- Troubles finding a suitable place to build the plants
- Biogas plants have bad reputation because of odour problems
- Lack of suitable organic waste to boost the biogas production

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Thank you for your attention…