Climate and greenhouse gasses

NØK 2010

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Outline

1. Reduction of greenhouse gasses (GHG) from livestock production. Scientific status

2. Role of livestock production in GHG and environmental issues. Holistic approach

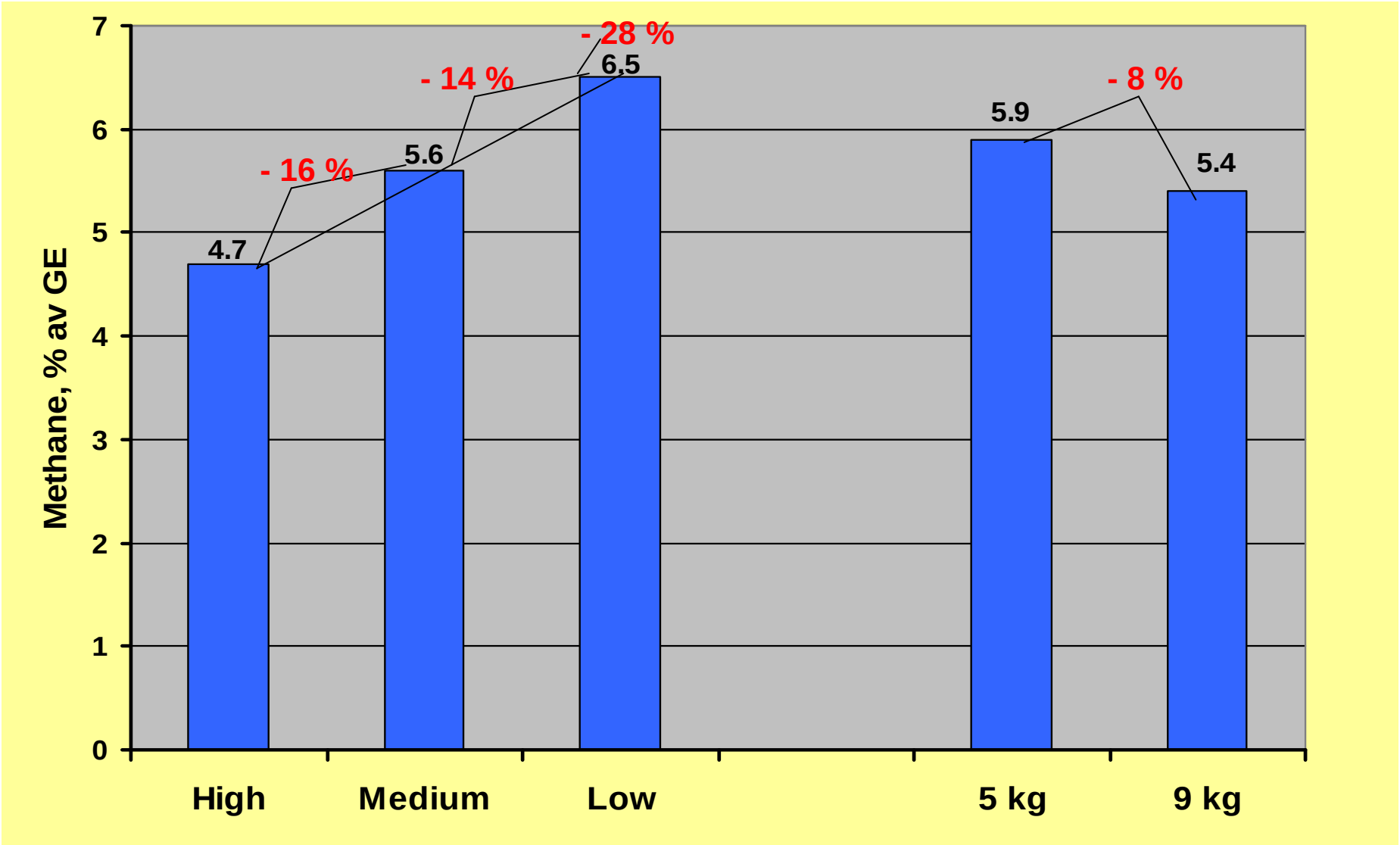
3. Lowering methane and nitrous oxide emissions through improving feed use efficiency.

Scientific status

- Slow progress!
  - No great breakthroughs have been published in 2008-2010

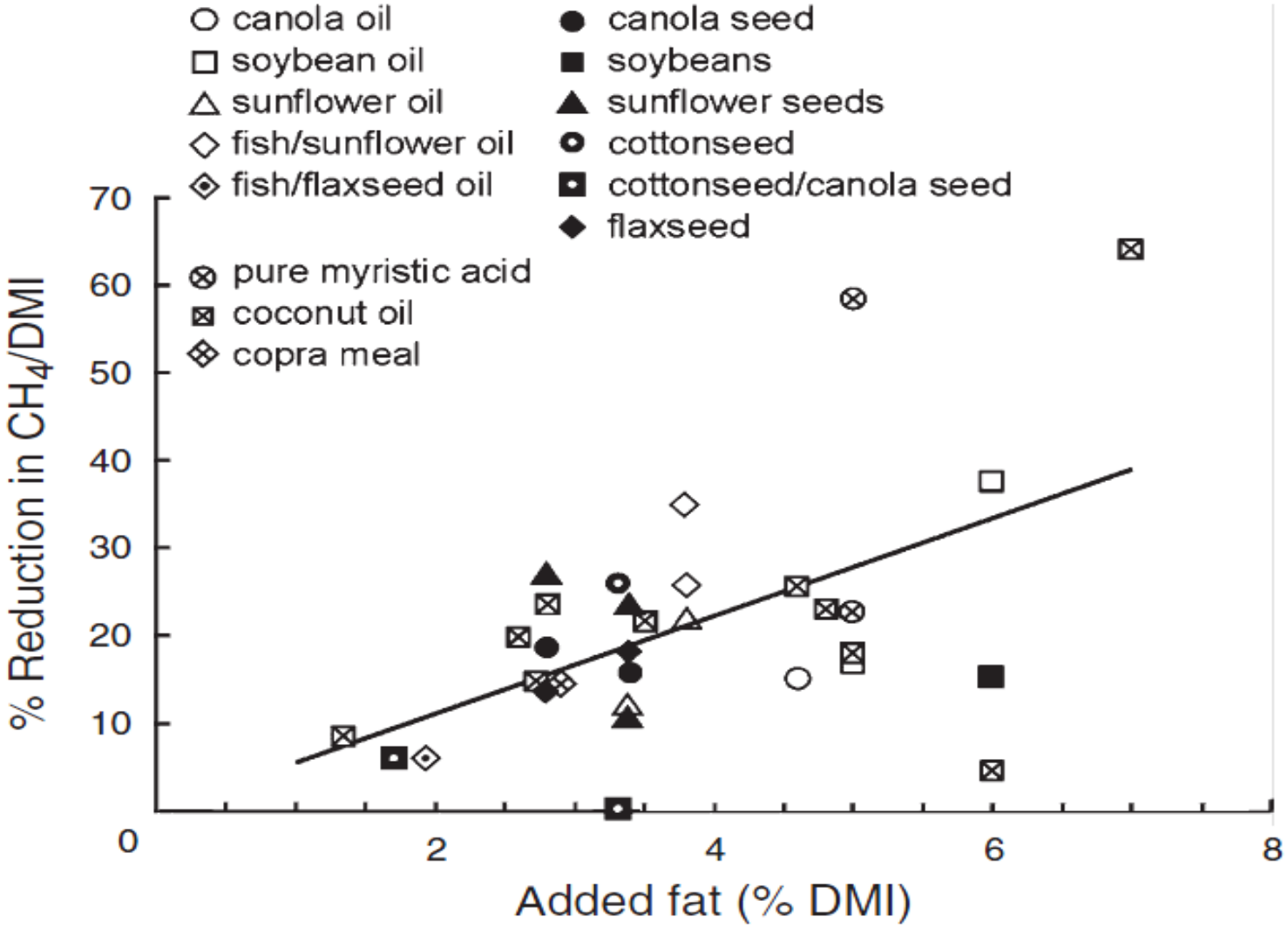
- World conference 2010

Effect of forage digestibility and amount of concentrate on methane production



Garmo et al, 2009

Effect of added fat on the reduction on methane production, % of control diet



Beauchemin et al, 2007

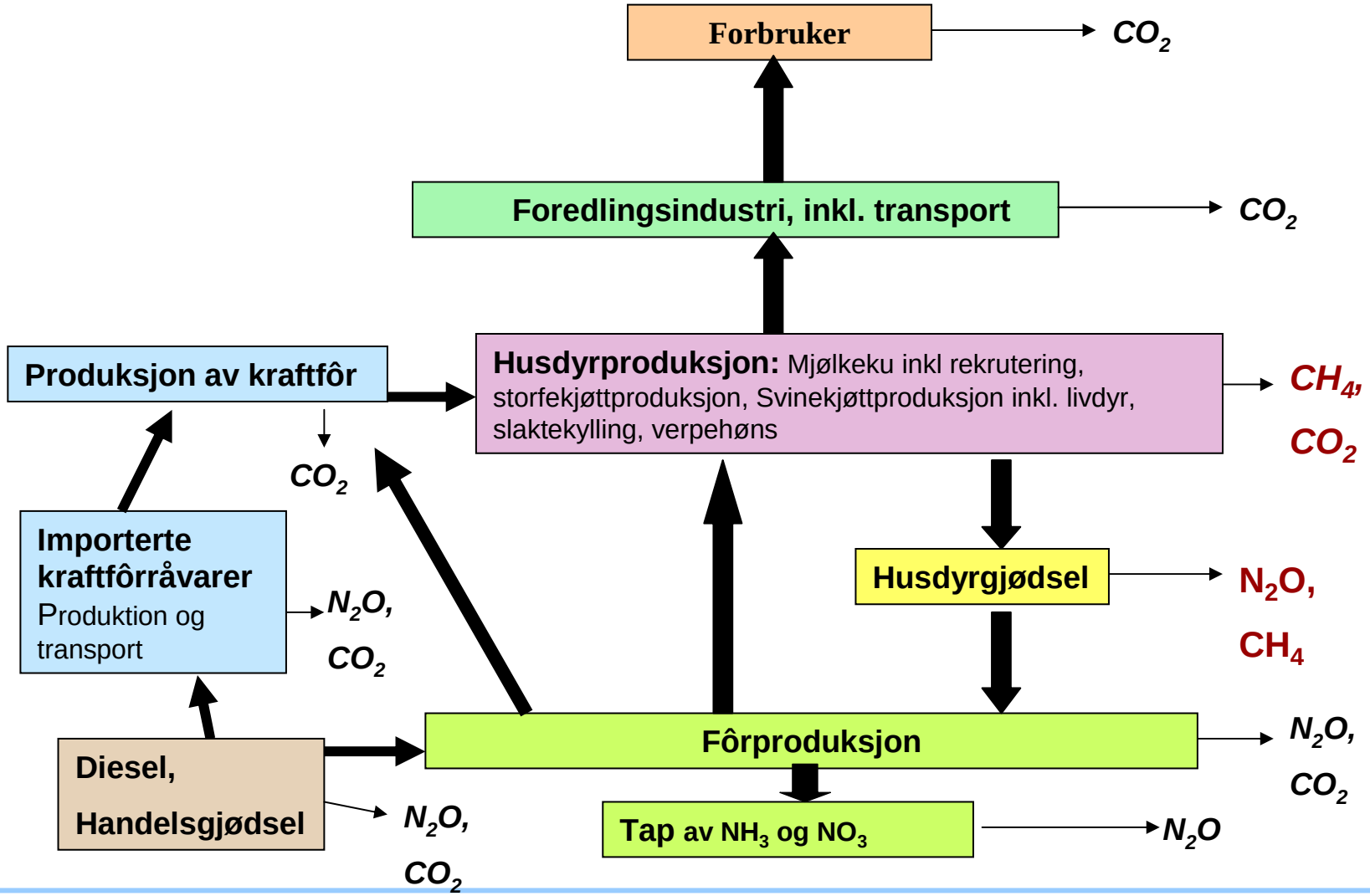
Livestock production and environmental issues

Holistic approach and life cycle assessment (LCA)

- Climate impact
- Energy use
- Land use
- Acidification
- Eutrophication

- LCA scenario from a 100-cow dairy farm in western Sweden.
- Data from *Strid and Bertilsson 2010*
- Effect of five different feed rations
  - "Normal" (diet 1)
  - Distillers dried grains (diet 2)
  - More and better silage (diet 3)
  - Beet pulp and maize silage (diet 4)
  - Rapeseed, peas, clover (diet 5)

Life cycle assessment (LCA)



Emanuelson et al., 2007

Feeding five different diets to meet the milk yield of 9000 kg ECM

	Diet 1 ”Normal”	Diet 2 Distillers grain	Diet 3 Better forage	Diet 4 Beet pulp + maize	Diet 5 Rapeseed + peas
Kg dry matter	6090	6095	6020	5542	5736
Forage, %	57	57	75	47	61
Soya, kg	239	185	145	380	0
Locally produced, %	94	96	97	91	100

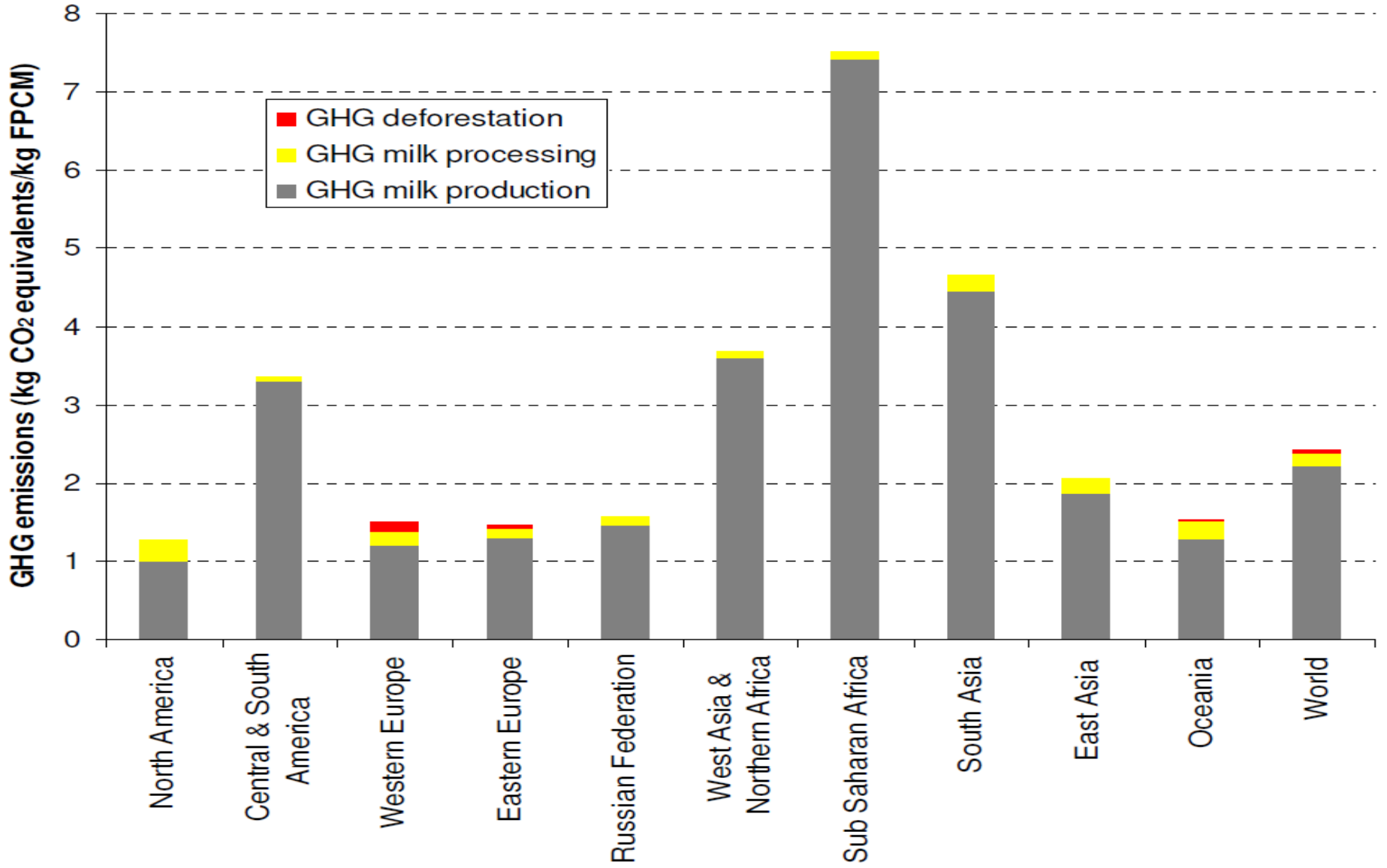
Data from Strid and Bertilsson, 2010

Relative environmental impact (%) compared to the "Normal diet"

	Diet 2 Destillers grain	Diet 3 Better forage	Diet 4 Beet pulp + maize	Diet 5 Rapeseed + peas
Energy use	97	83	101	74
Land use	96	103	93	111
Climate impact	100	99	98	89
Acidification	101	114	88	94
Eutrophication	98	106	92	114

Data from Strid and Bertilsson, 2010

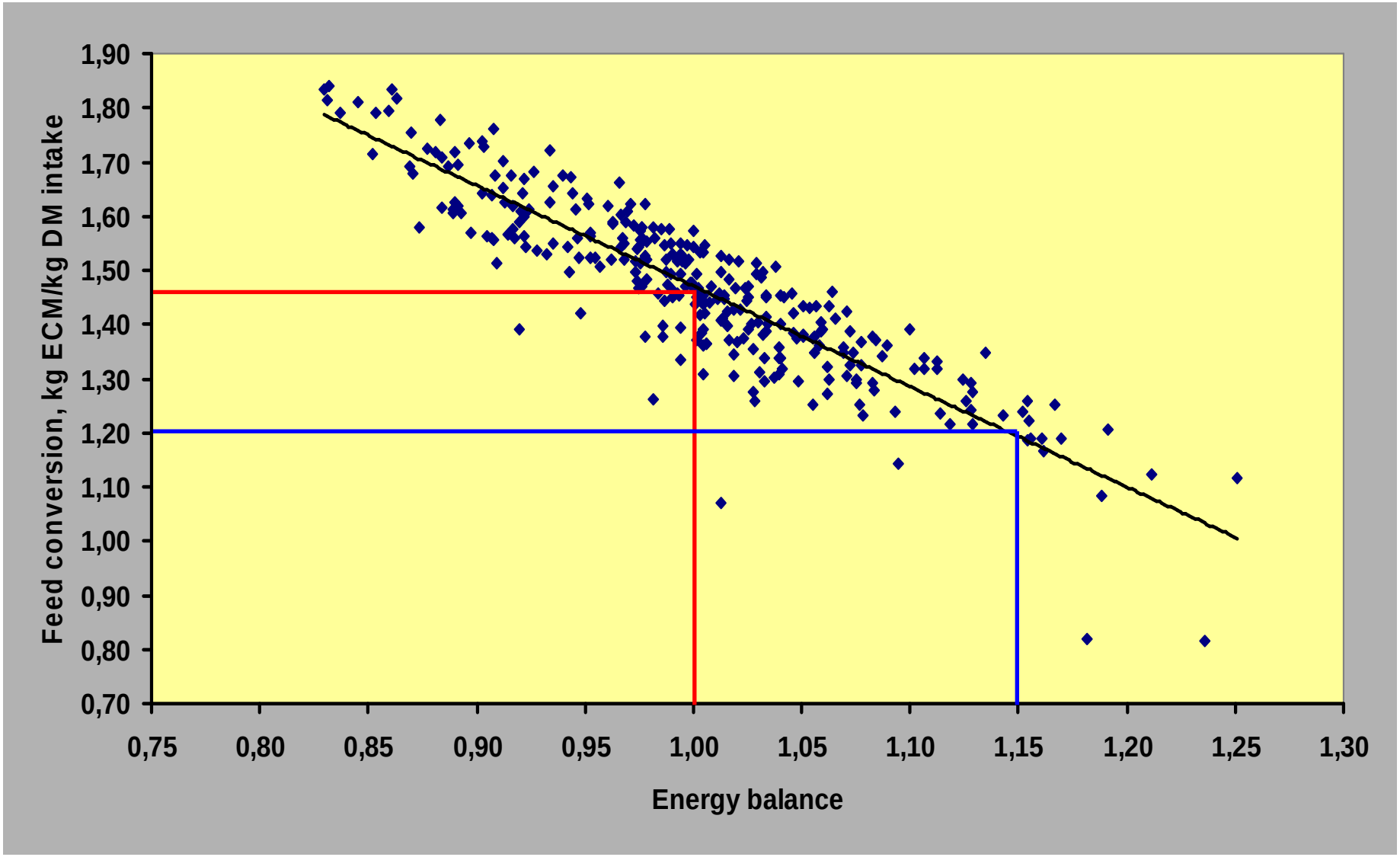
LCA analysis. GHG emission per kg ECM from the dairy sector. FAO report 2010



Improving feed efficiency

- Feeding strategies with a high feed conversion factor (kg milk per kg feed input)
  - Cost effective
  - Lower nutrient losses
  - Lower GHG emission
- Efficient feed evaluation system
  - Calculate nutrient efficiency and production responses

Relationship between feed conversion efficiency and Energy balance. Nordic experiments



Volden, 2009

Use of NorFor to calculate nutrient efficiency and methane production. Effect of dry matter intake

	15 kg DM	20 kg DM	25 kg DM
Methane production			
MJ/d	20.0	24.1	27.9
% GE intake	6.0	5.4	5.0
g/kg ECM	17.1	14.0	12.3
CP intake, g/d	2450	3266	4083
CP, g/kg DM	163	163	163
PBV, g/kg DM	28.0	17.0	8.1
N utilization, % of N intake			
Milk	27.4	30.4	32.4
Faeces	30.8	32.8	34.2
Urine	41.8	36.8	33.5

Conclusions

- No large improvements to reduce ruminal methane production have been recently published
- Strategies to reduce the GHG emissions need to be assessed on a whole farm basis
- Reduction strategies should always consider associated environmental impacts to ensure that reductions in one part of the system do not stimulate higher risks in another part of the system
- On a global scale GHG emission from the western Europe dairy sector is low
- On the short run we must focus on improved feed efficiency