DTU

Consequences of agro-biofuel production for greenhouse gas emissions

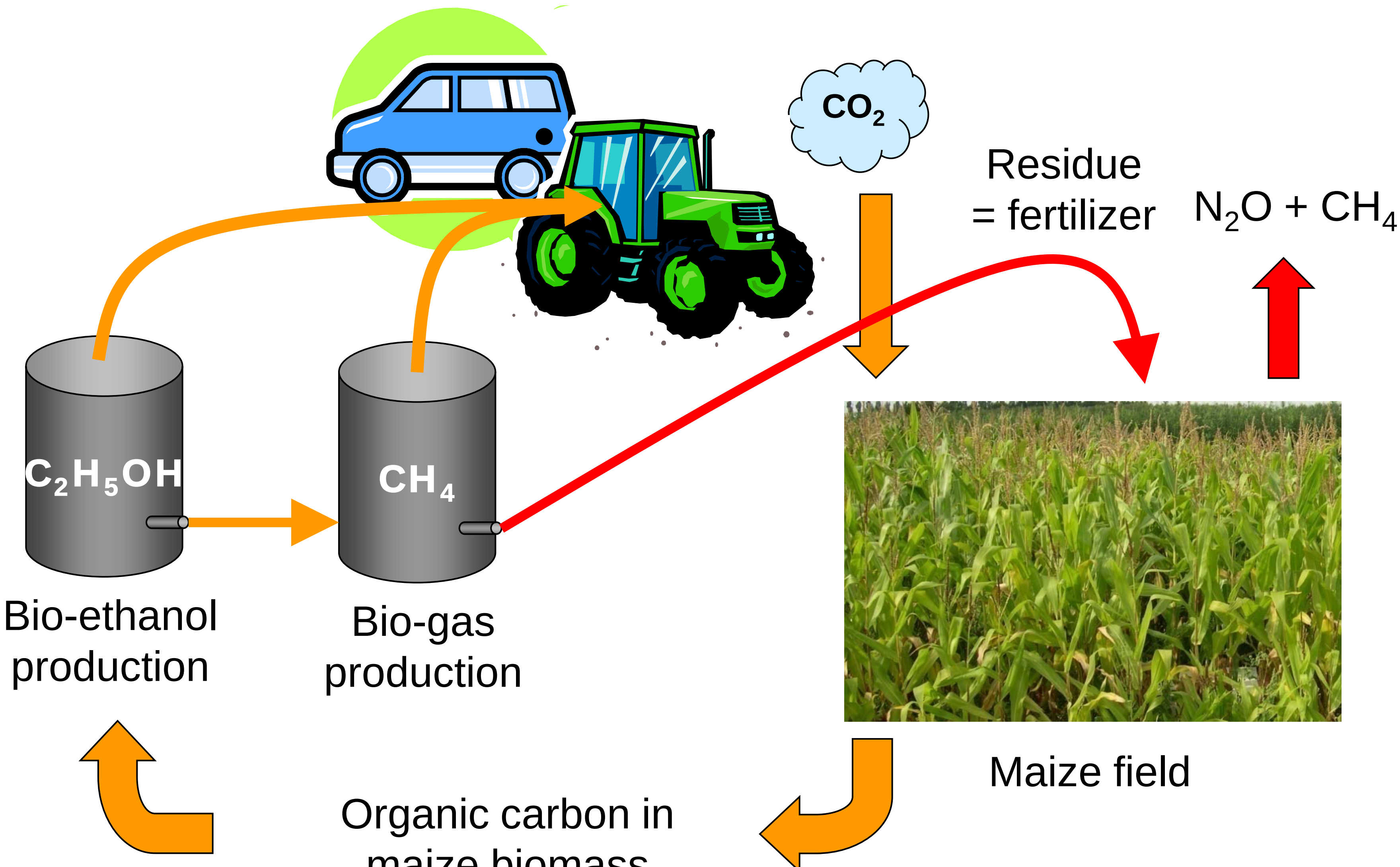
NJF seminar, 10 September 2009

Dr. Mette S. Carter

Dr. Henrik Haugaard-Nielsen
Dr. Anders Johansen
Prof. Per Ambus

Risø DTU
National Laboratory for Sustainable Energy

Carbon cycling in biofuel production

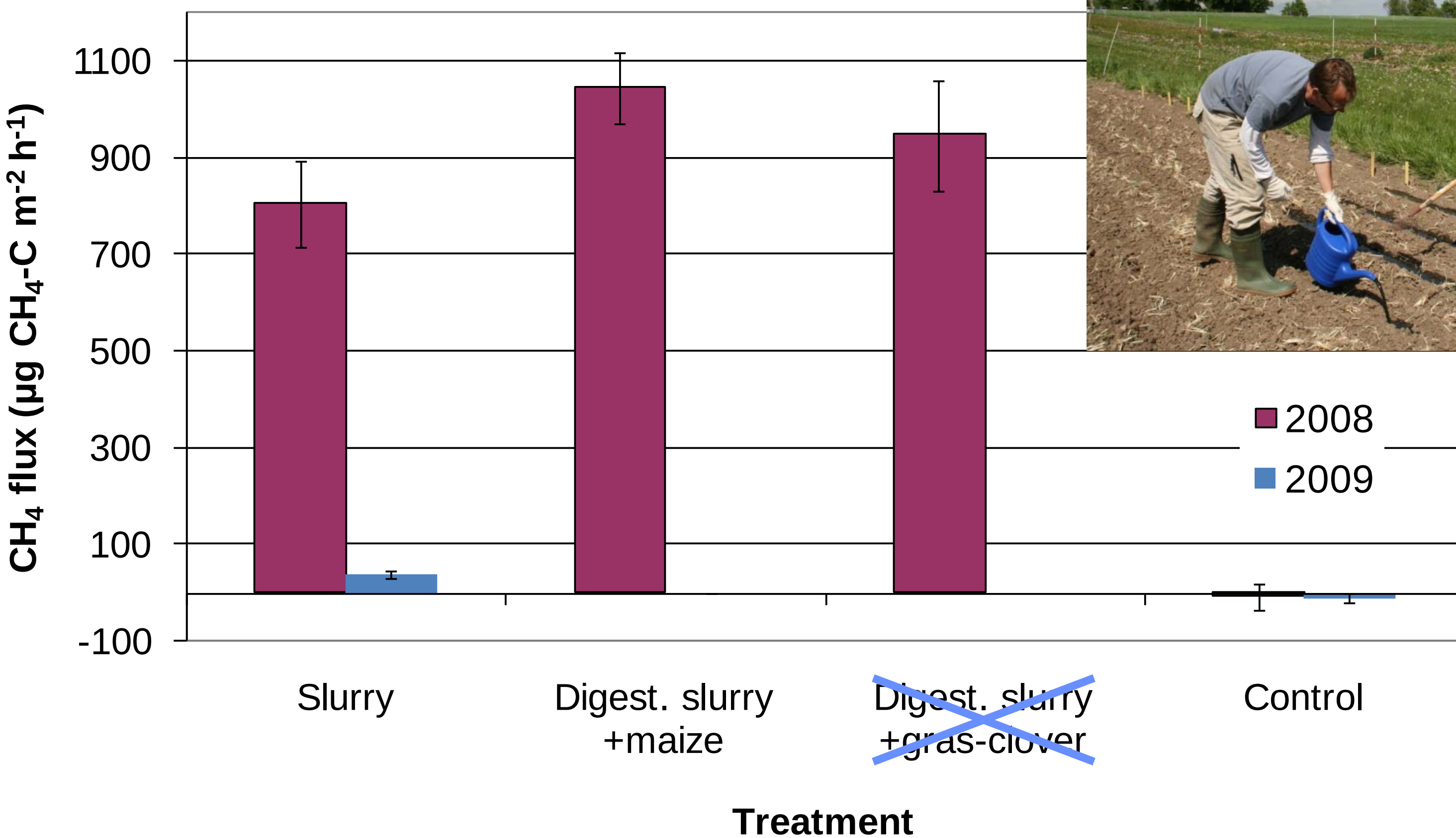


CH_4 flux the day after residue application

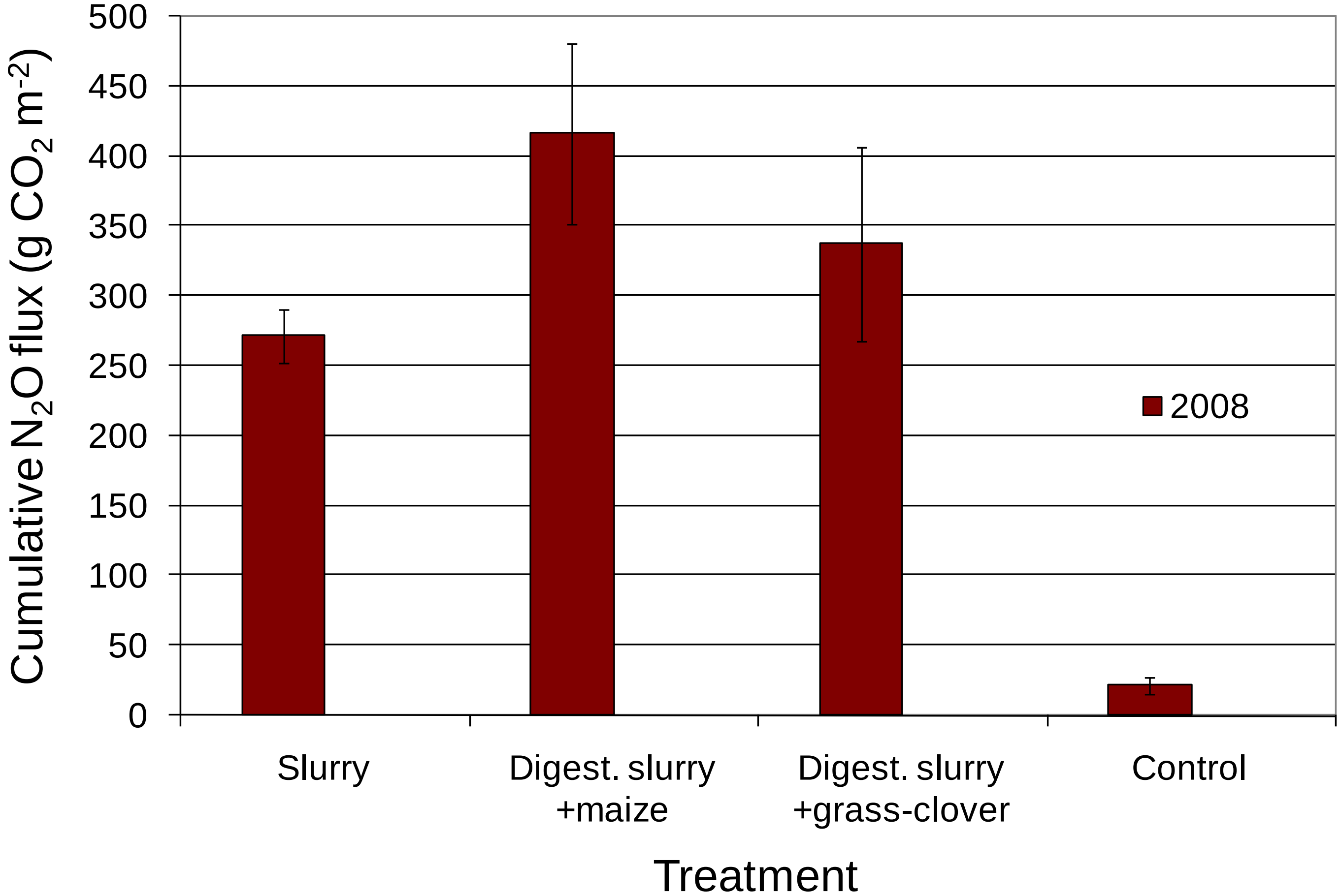
150 kg plant available N ha^{-1}

CH_4 flux the day after residue application

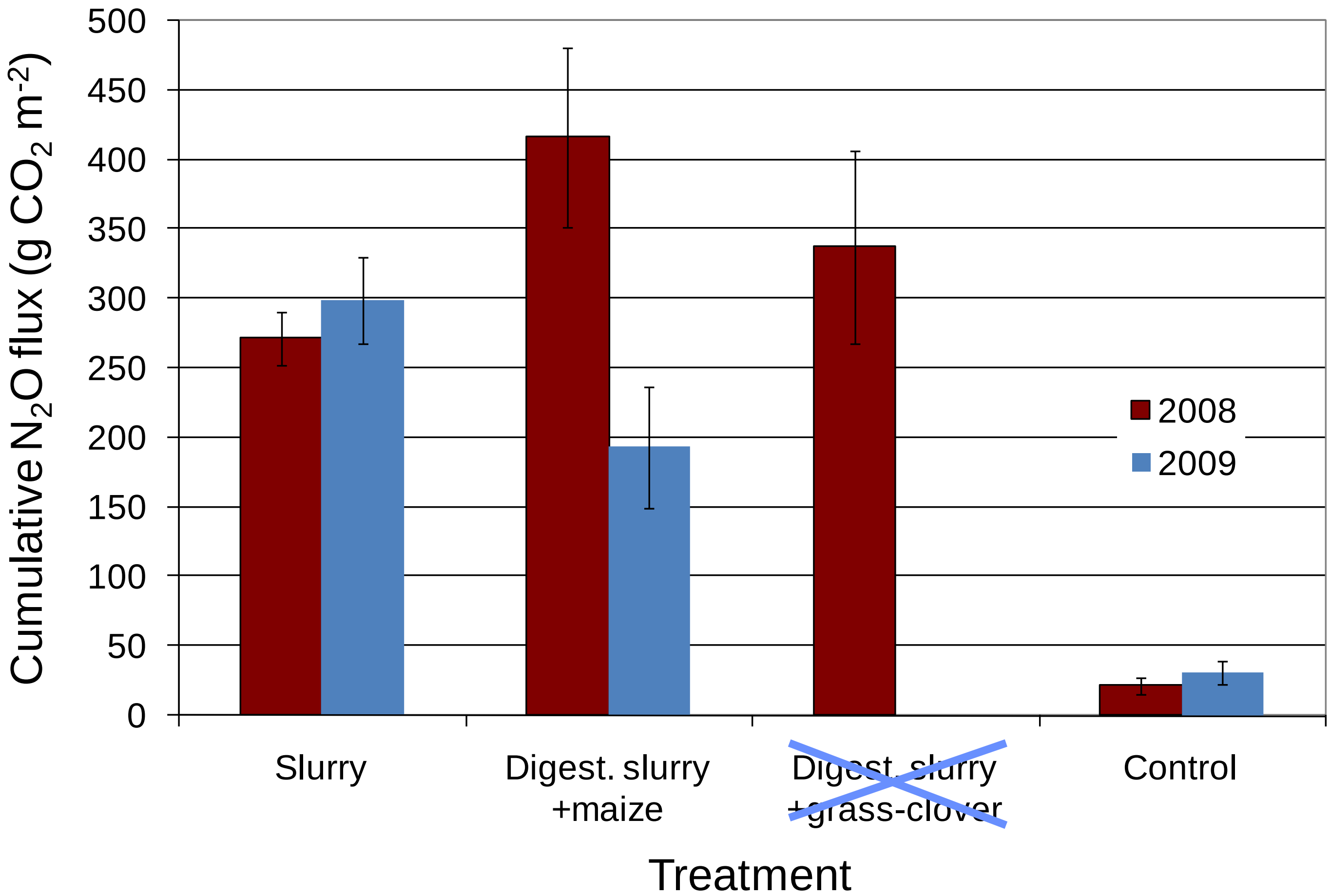
150 kg plant available N ha^{-1}



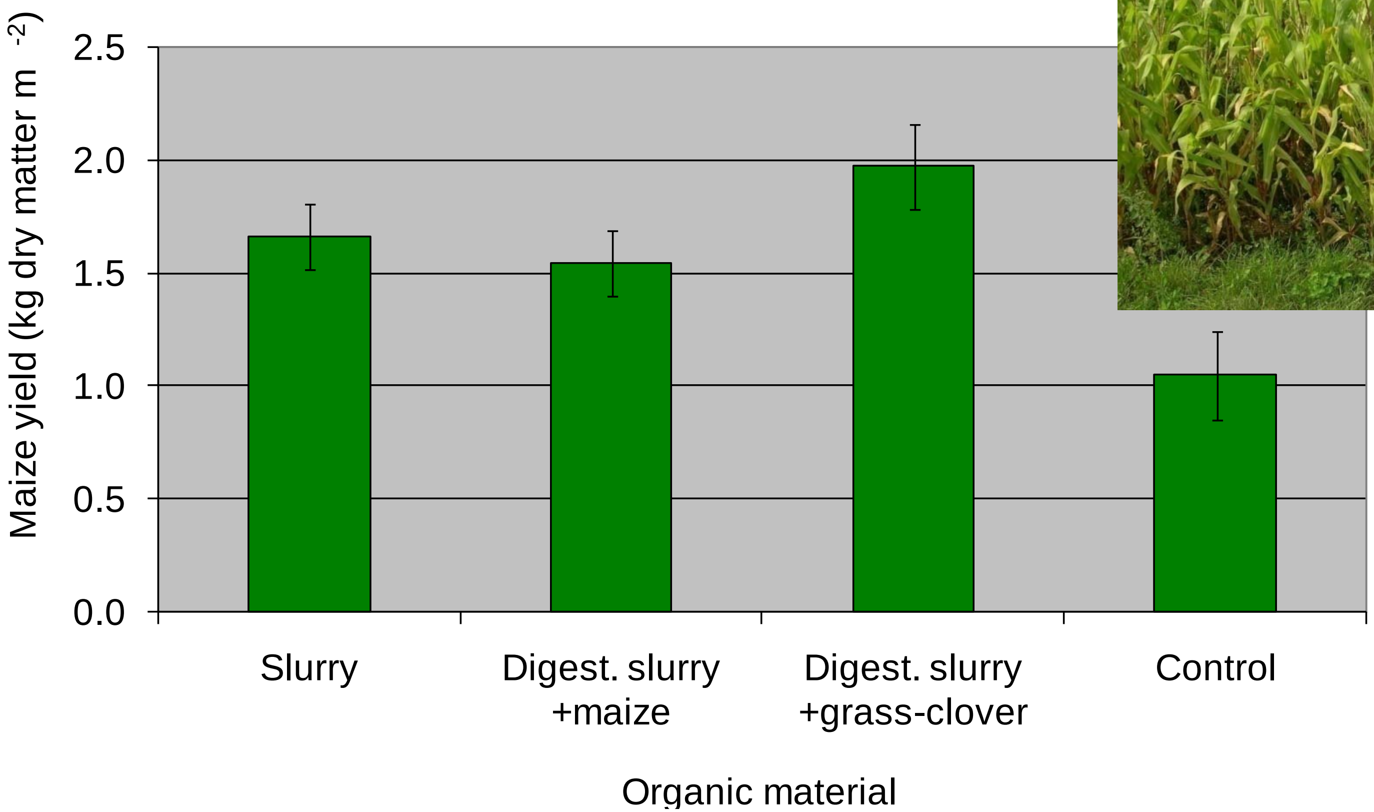
Cumulative N_2O flux during the first 2 months after application (in CO_2-equivalents)



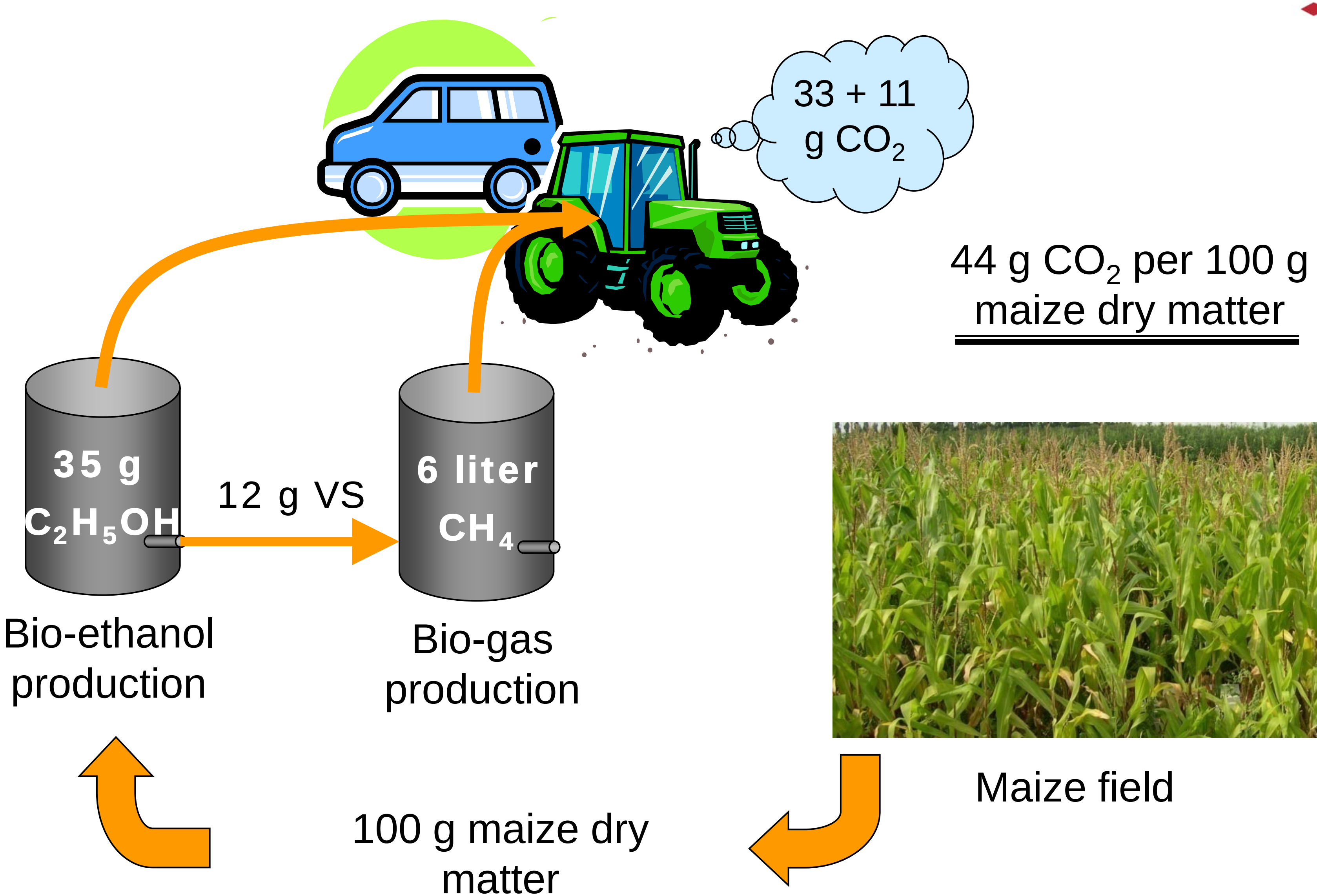
Cumulative N_2O flux during the first 2 months after application (in CO_2-equivalents)



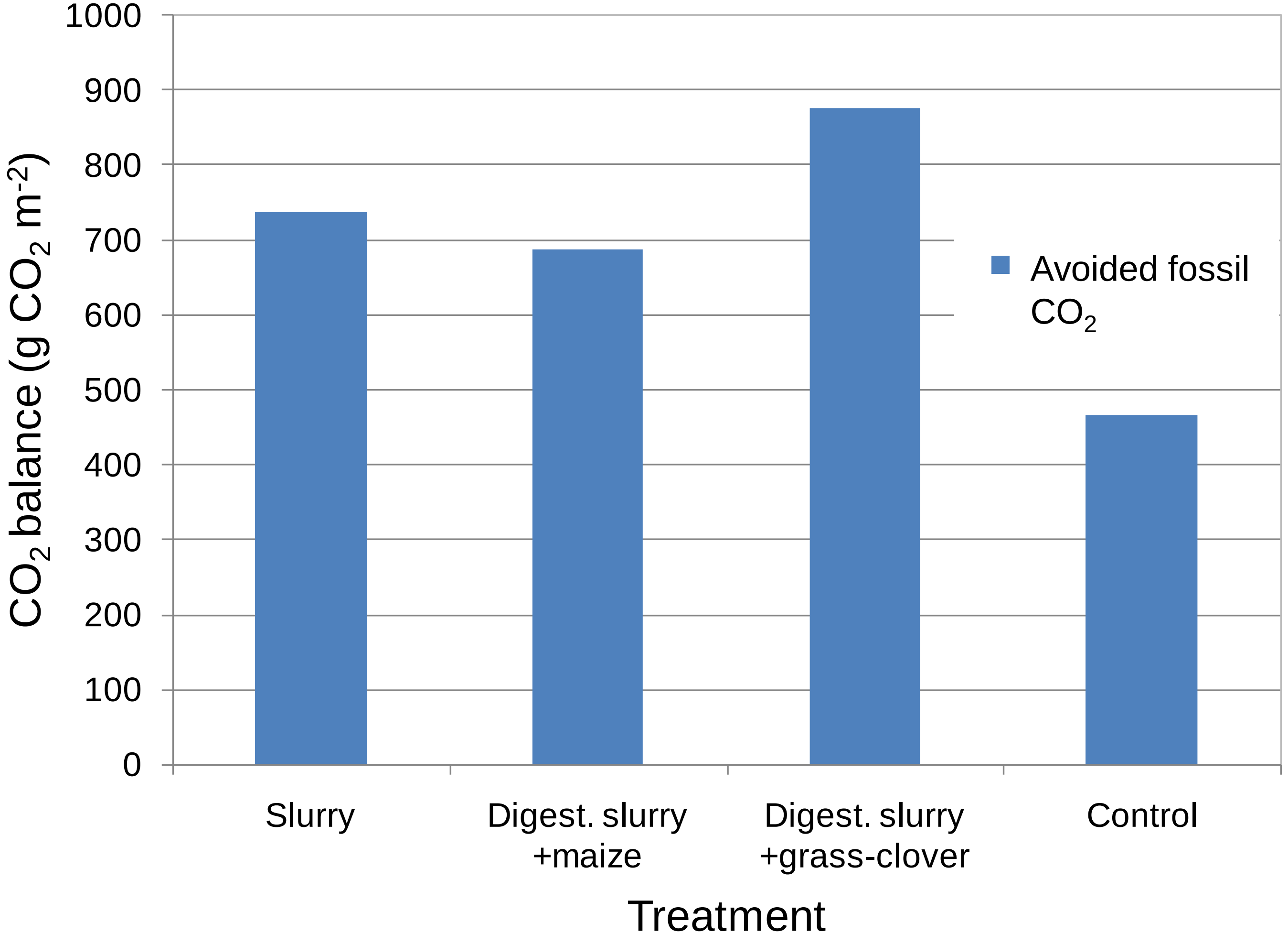
Maize yield 2008 (kg dry matter m^{-2})



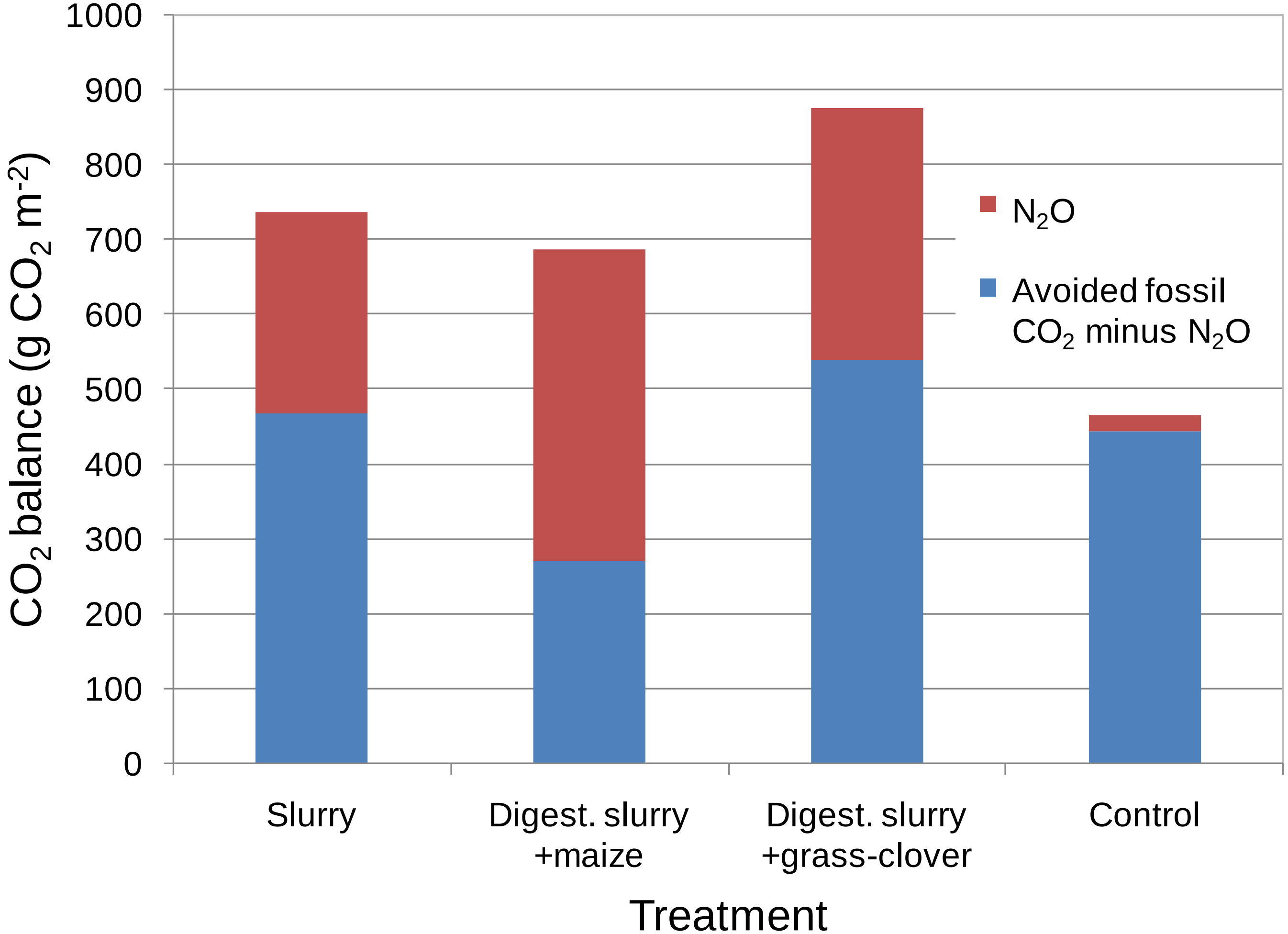
Conversion of maize biomass to biofuels



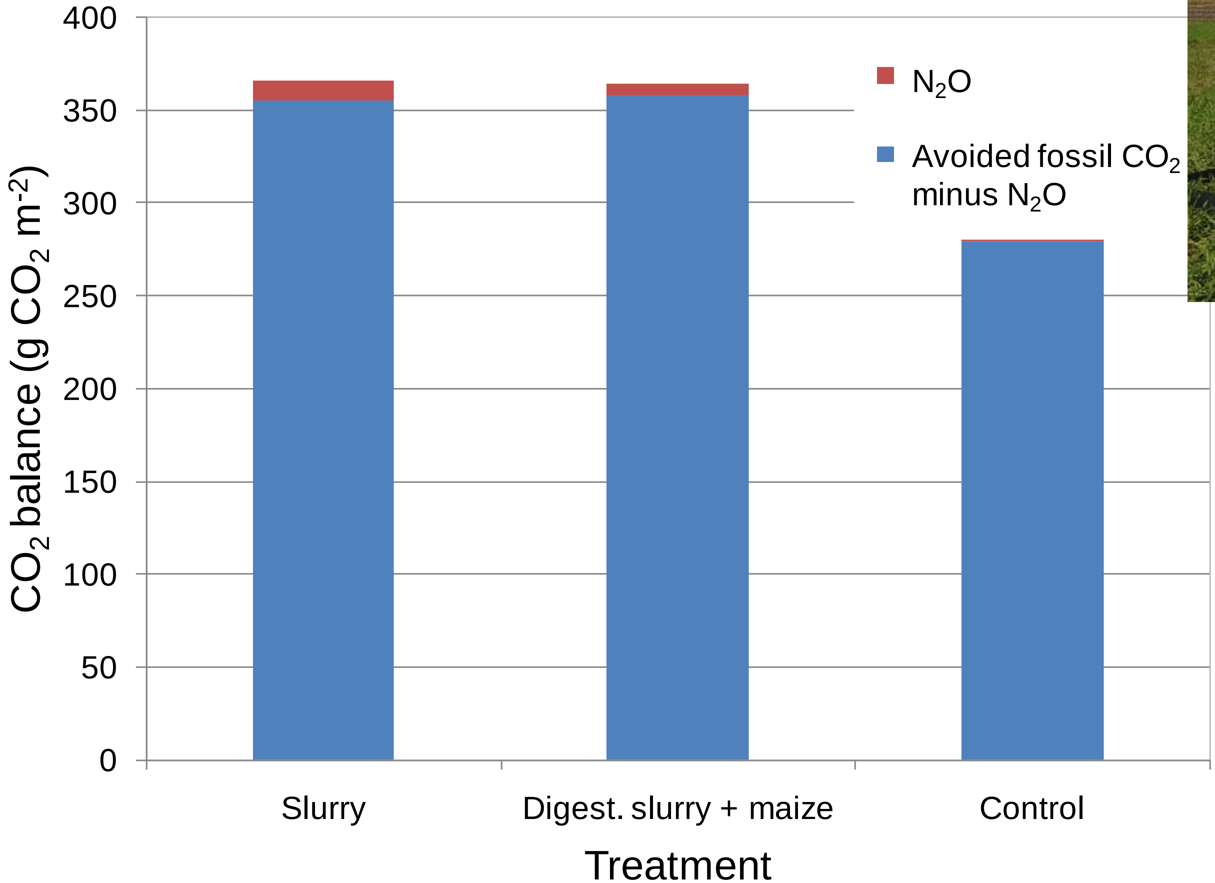
N_2O emission versus avoided fossil CO_2 for maize biofuels



N_2O emission versus avoided fossil CO_2 for maize biofuels



N_2O emission versus avoided fossil CO_2 for winter rye biofuels



Major findings

- Anaerobic digestion of slurry and plant material may act to reduce N_2O emissions related to fertilization

— but only if the fermentation process is completed

- No greenhouse gas advantage of fertilizing the maize crop because the extra crop yield was offset by increased field emissions of N_2O

- Winter rye biofuels have a slightly lower net CO_2 gain as compared to maize biofuels, but winter rye still is a potential energy crop

Thanks to all the people who contributed...

Mette Hedegaard
Christel Barker
Nina Wiese Thomsen
Liselotte Meltofte
Anja Nielsen
Marianne Munck
Kristian Albert
Poul Sørensen
Anne Belinda Thomsen
Mette Hedegaard Thomsen
Piotr Oleskowicz-Popiel
Henrik Bangsø Nielsen
Jens Ejbye Schmidt
Steffen Blume
Ingelis Larsen
Erik Steen Jensen
Hanne Østergård

BioConcens:
Biomass and bioenergy production in organic agriculture – consequences for soil fertility, environment, spread of animal parasites and socio-economy

www.bioconcens.elr.dk