

# “Moving sustainability from the barricades to the boardroom”

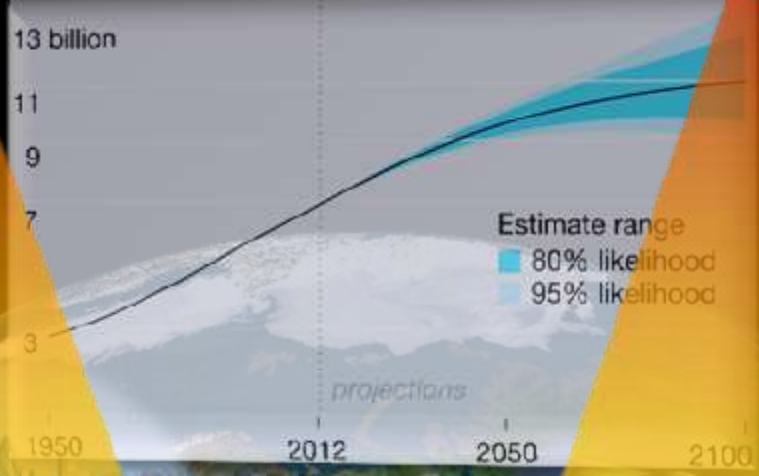
*4 constructive challenges for the dairy industry*

Rogier Schulte, Joan Reijs and Imke de Boer



Biosphere integrity

Biochemical cycles



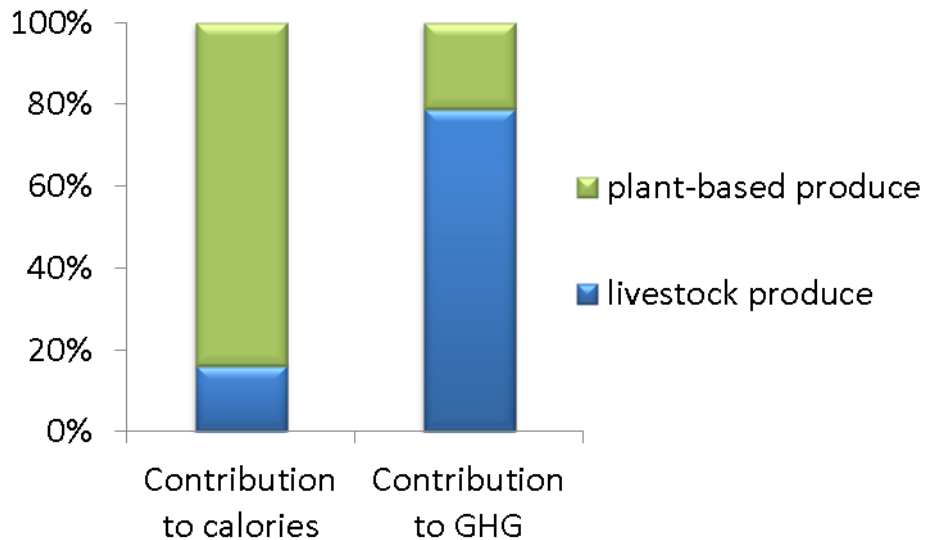
Climate change

Land use change

Ocean acid'n



# Livestock: help or hindrance?



## Sources:

- FAO (2006)
- Krausmann Fridolin, Karl-Heinz Erb, Simone Gingrich, Christian Lauk and Helmut Haberl, 2008. Global patterns of socioeconomic biomass flows in the year 2000: A comprehensive assessment of supply, consumption and constraints. *Ecological Economics* 65(3), 471-487. doi:10.1016/j.ecolecon.2007.07.012

# Livestock: help or hindrance?

Environmental Research Letters

LETTER

Impact of livestock on phosphorus and nitrogen emissions

	GHG	
	Emissions [Tg CO <sub>2</sub> eq yr <sup>-1</sup> ]	Share
Agriculture	1062	100%
Livestock	861	81%

nitrogen, sulphur, phosphorus, land-use, water

Lassaletta<sup>1,2</sup>, Stefan Reis<sup>3,4</sup>, and Henk Westhoek<sup>3</sup>

Share due to agriculture in EU27 with...



	Water quality N		Water quality P <sup>b</sup>	
	N Emissions [Tg N yr <sup>-1</sup> ]	Share	DIP <sup>c</sup> Emissions [Tg P yr <sup>-1</sup> ]	Share
Agriculture	6.0	100%	0.025	100%
Livestock	4.4	73%	0.018	73%
Food	4.2			
Food imports	0.6			



	Biodiversity <sup>b</sup>		Biodiversity <sup>b</sup>	
	Land Use Area [Mio km <sup>2</sup> ]	Share	Loss of biodiversity Relative MSA [%]	Share
Agriculture	2.0	100%	-34%	100% <sup>a,c</sup>
Livestock	1.4	69%	-25%	76%
Food	1.4	69%	-25%	74%
Food imports	0.2	11%		



# Livestock: help or hindrance?

*"Eat less animal produce"*

*"Reduce food waste"*

*"Eat local"*

*"Increase efficiency"*

# Entry point 1: Eat less animal produce?

## Global Change Biology

Global Change Biology (2013) 19, 3–18, doi: 10.1111/j.1365-2486.2012.02786.x

### REVIEW

## Livestock greenhouse gas emissions and mitigation potential in Europe

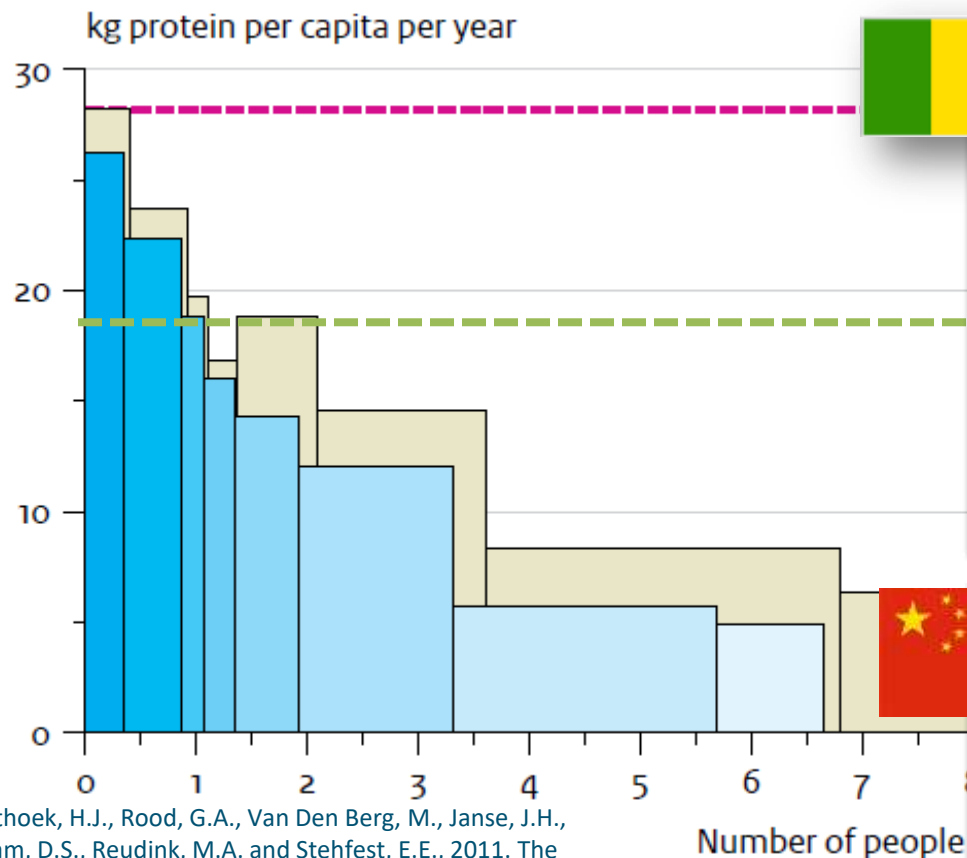
JESSICA BELLARBY\*, REYES TIRADO†, ADRIAN LEIP‡, FRANZ WEISS‡, JAN PETER LESSCHEN§ and PETE SMITH\*

**Table 11** Summary of mitigation options

Description	Emission savings in Mt CO <sub>2</sub> e per year	Emission reduction in%*
Production related mitigation options		
Choice of production system to grass-fed beef	12–26	2–4
Grassland management	4–10	1–2
Consumer-impacted mitigation options		
Eat no beef from South America	22–31 <sup>†</sup>	3–5
Eat no meat from European beef suckler herd	67–94	10–14
One less serving of milk or 20 g less cheese (per week)	15–19	2–3

# Entry point 1: Eat less animal produce?

## Global intake of animal protein per region



Westhoek, H.J., Rood, G.A., Van Den Berg, M., Janse, J.H., Nijdam, D.S., Reudink, M.A. and Stehfest, E.E., 2011. The Protein Puzzle: The Consumption and Production of Meat, Dairy and Fish in the European Union. *European Journal of Food Research & Review* 1(3), 123-144.



# Entry point 1: Eat less animal produce?

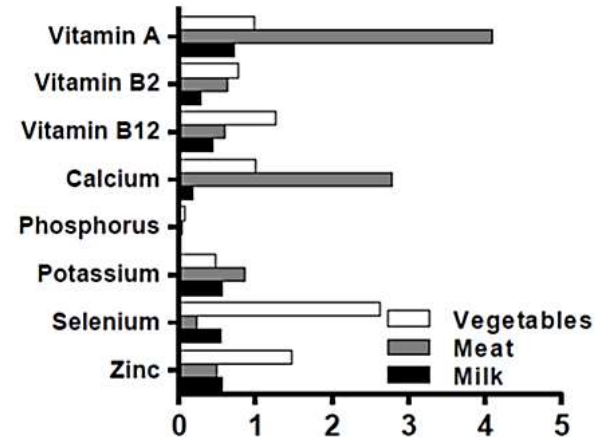
## 1. Milk: role in nutritional security



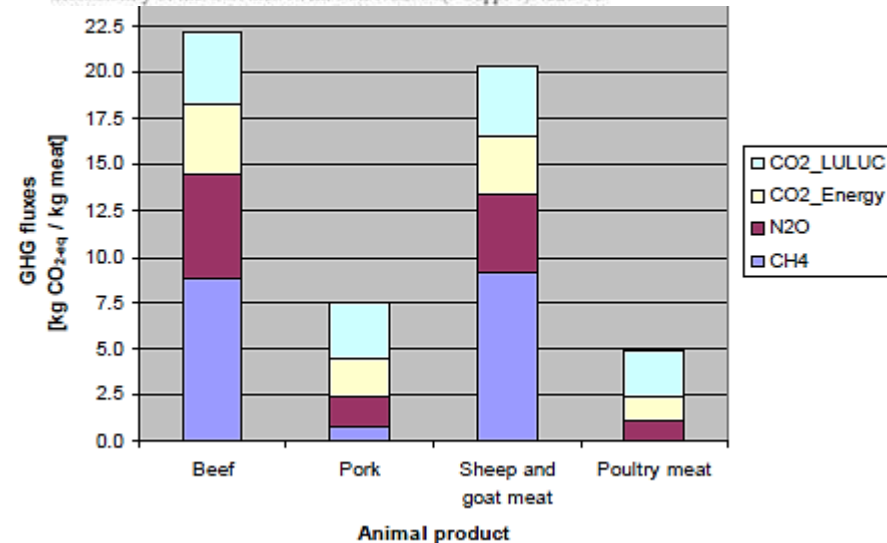
## 2. Mono-gastrics: efficient... ... but competing for cereals...



Figure 4: cost (in US\$) of 10% daily value of nutrients (17).



Drewnowski A (2011) The contribution of milk and milk products to micronutrient density and affordability of the U.S. diet. *J Am Coll Nutr.* 30(5 Suppl 1):422S-8S.

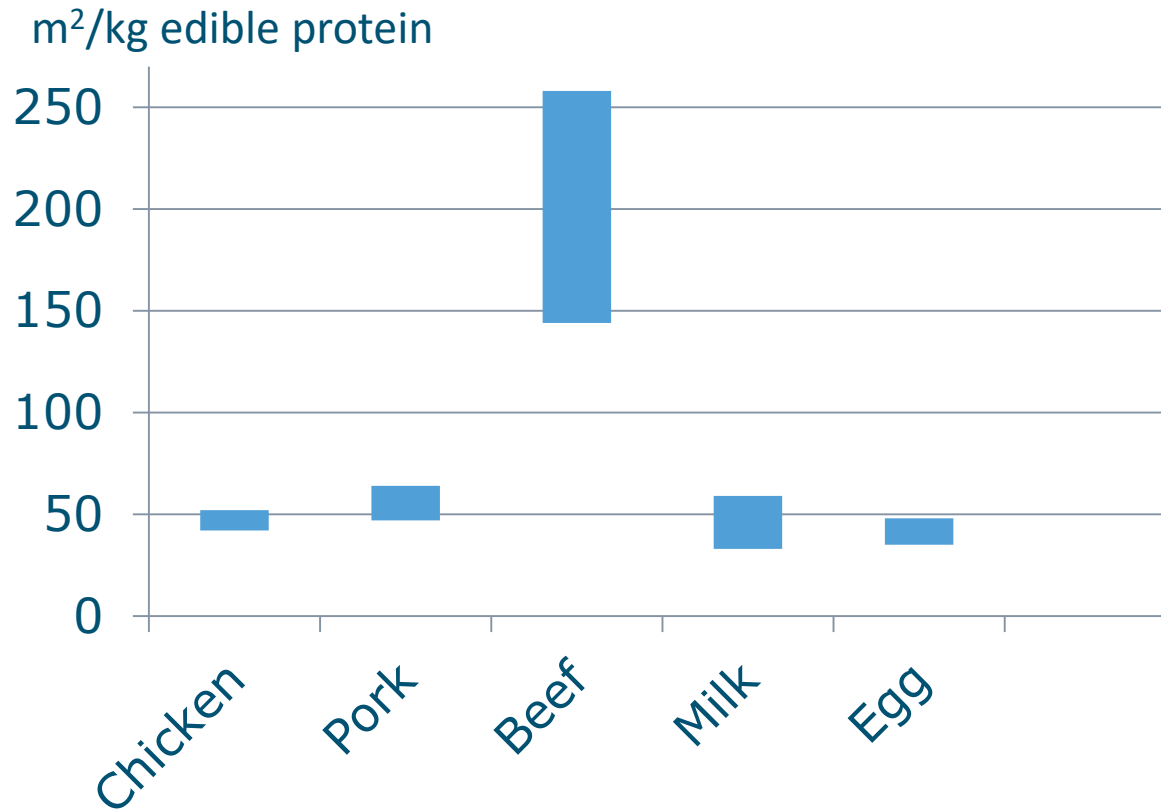


Leip, A. *et al.*, 2010. Evaluation of the livestock sector's contribution to the EU greenhouse gas emissions (GGELS) – final report. European Commission, Joint Research Centre, 323 pp.



# Entry point 1: Eat less animal produce?

## 3. Red meat: ... less efficient...



# Entry point 1: Eat less animal produce?

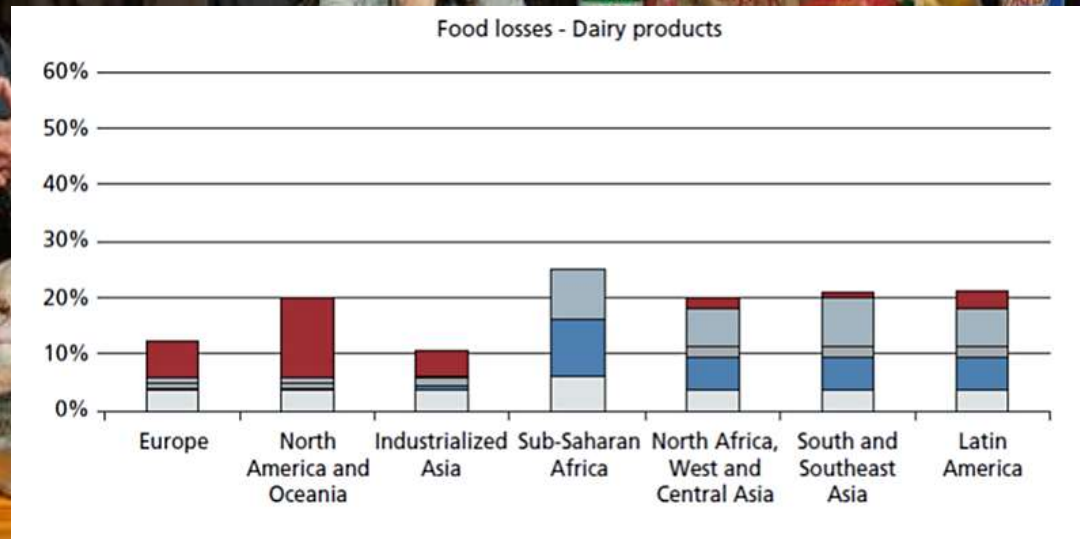
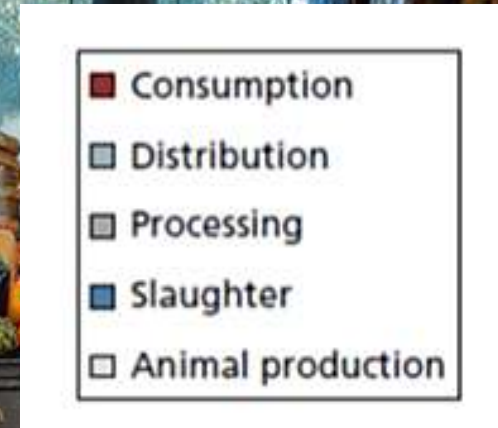
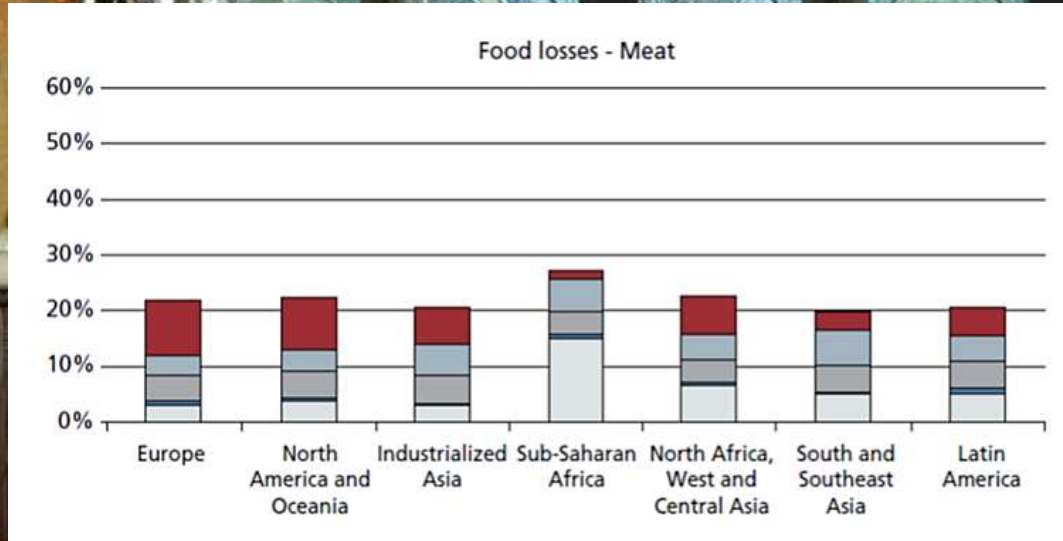
3. Red meat: ... less efficient... but... can convert inedible protein...



## Entry Point 1:

Should the question "*eat less animal produce?*"  
be replaced with: "*which food, for whom, grown where?*"

# Entry point 2: Waste not, want not?

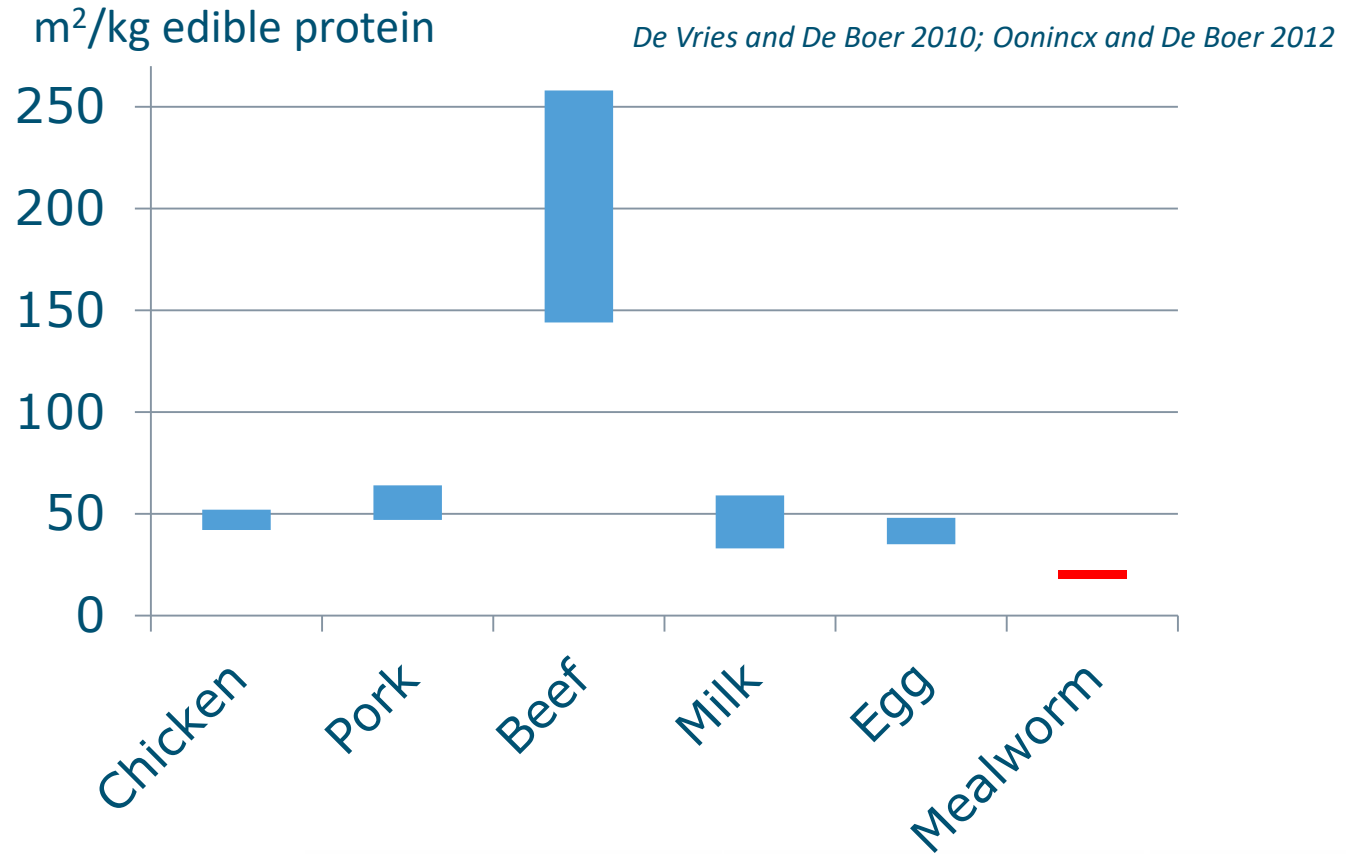


# Entry point 2: Waste not, want not?

- Consumption
- Distribution
- Processing
- Slaughter
- Animal production



# Entry point 2: Waste not, want not?



# Entry point 2: Waste not, want not?

## Feed sources for livestock: recycling towards a green planet

Hannah van Zanten

GWP indirect impact larvae meal  
kg CO<sub>2</sub>-eq/ton larvae meal

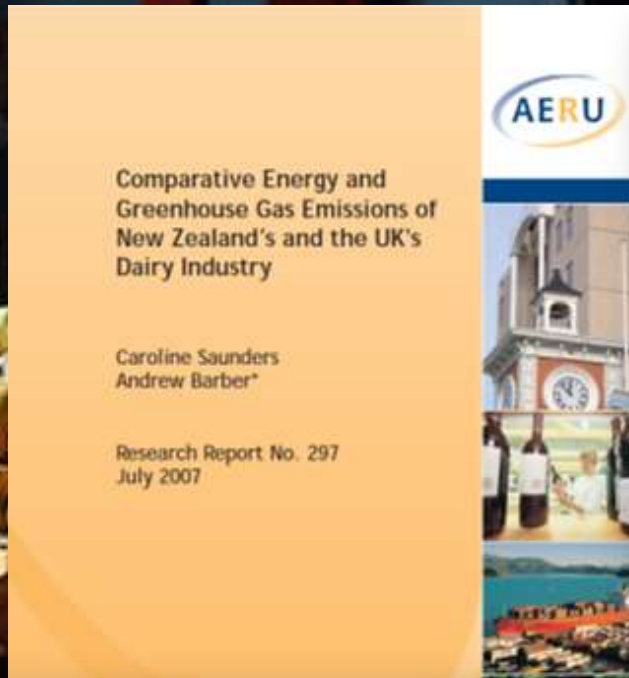


### Entry Point 2:

Should the question "waste not?"  
be replaced with: "how can we close cycles?"

# Entry point 3: Eat local?

Photo: National Geographic



**Comparative Energy and Greenhouse Gas Emissions of New Zealand's and the UK's Dairy Industry**

Caroline Saunders  
Andrew Barber\*

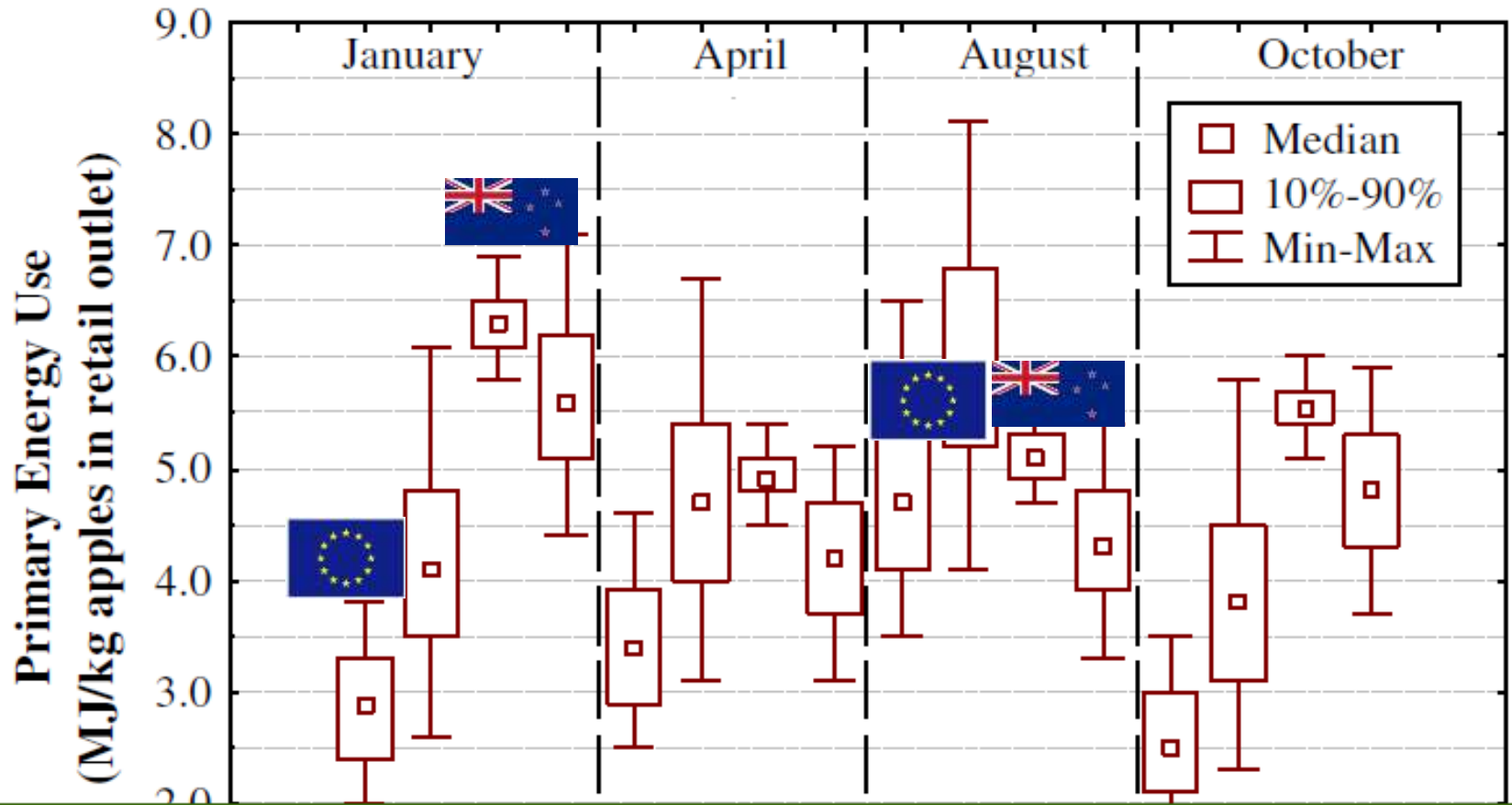
Research Report No. 297  
July 2007

NZ and UK dairy greenhouse gas emissions

	GWP <sub>100</sub> kgCO <sub>2</sub> eq/ha		GWP <sub>100</sub> kgCO <sub>2</sub> eq/kgMS	
	NZ	UK	NZ	UK
CO <sub>2</sub>				
Energy	1,145 <sup>1</sup>	2,825	1.37 <sup>1</sup>	3.47 <sup>2</sup>
CH <sub>4</sub>				
Fermentation and manure mgmt	5,320	5,310	6.36	6.52
N <sub>2</sub> O				
Direct emissions N fert. input to soil	320	815	0.39	1.00
Direct emissions N excretion to soil	1,360	1,150	1.63	1.42
Indirect emissions atm. decomposition fert. N and excretion	390	280	0.47	0.35
Indirect emissions leaching fert. N and excretion	305	1,120	0.36	1.38
<b>Total (100% allocation to milk)</b>	<b>8,840</b>	<b>11,505</b>	<b>10.58</b>	<b>14.13</b>
<b>Total (85% allocation to milk)</b>	<b>7,530<sup>3</sup></b>	<b>9,775</b>	<b>9.01<sup>3</sup></b>	<b>12.01</b>

	GWP <sub>100</sub> kgCO <sub>2</sub> eq/ha		GWP <sub>100</sub> kgCO <sub>2</sub> eq/kgMS	
	NZ	UK	NZ	UK
<b>Total (100% allocation to milk)</b>	<b>8,840</b>	<b>11,505</b>	<b>10.58</b>	<b>14.13</b>
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# Entry point 3: Eat local?



Entry Point 3:

Should the question "*Should we eat local?*"

be replaced with: "*How can we optimise (and govern) regionalisation?*"



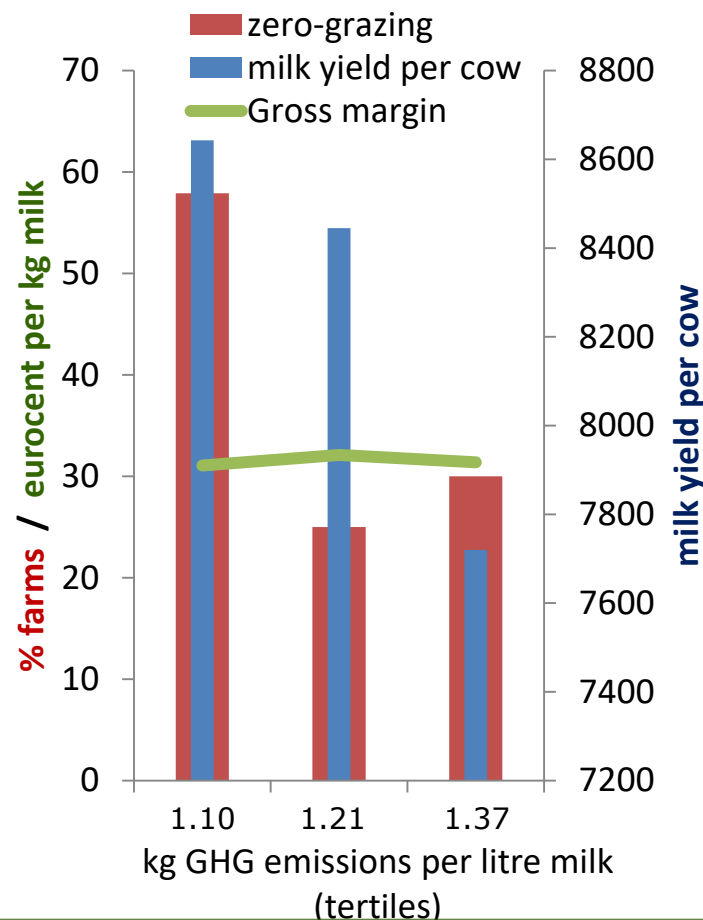
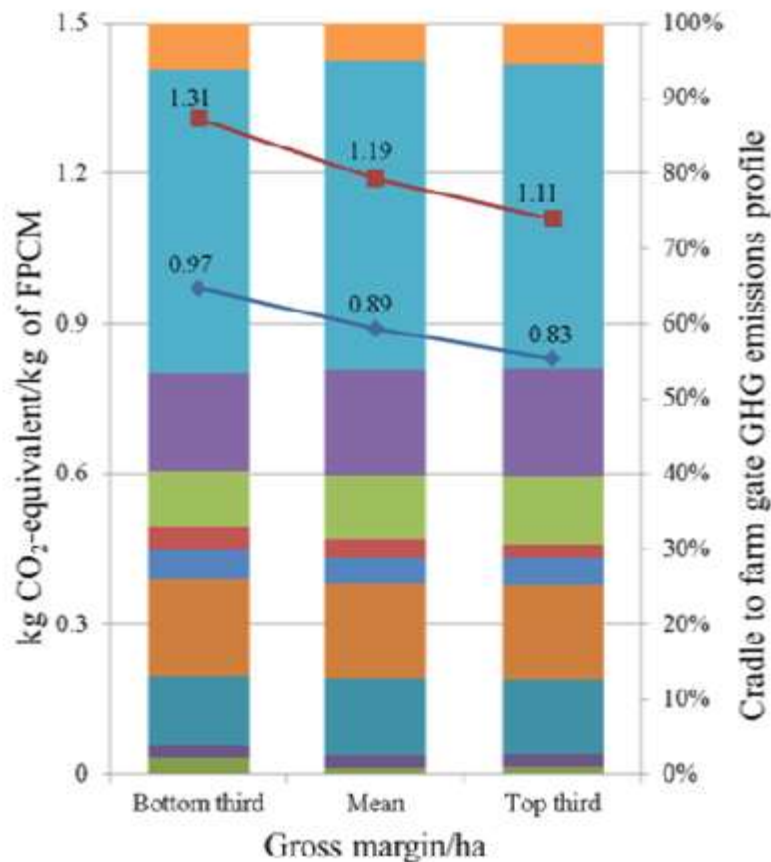
# Entry point 4: Carbon footprint: how low can we go?

I want to reduce my carbon footprint?

What should I aim for?

# Entry point 4: Carbon footprint: how low can we go?

Hennessy *et al.*, 2013. Measuring Farm Level Sustainability with the Teagasc National Farm Survey.



Source: Dutch FADN data  
Subset: specialised dairy farms 13,000-17,000 kg milk per ha

## Entry Point 4:

Should the question "How far can we reduce our C-footprint?" be replaced with: "What type of sustainability do we really want?"

# Towards a constructive debate

*"Eat less animal produce"*

*"Reduce food waste"*

*"Eat local"*

*"Increase efficiency"*

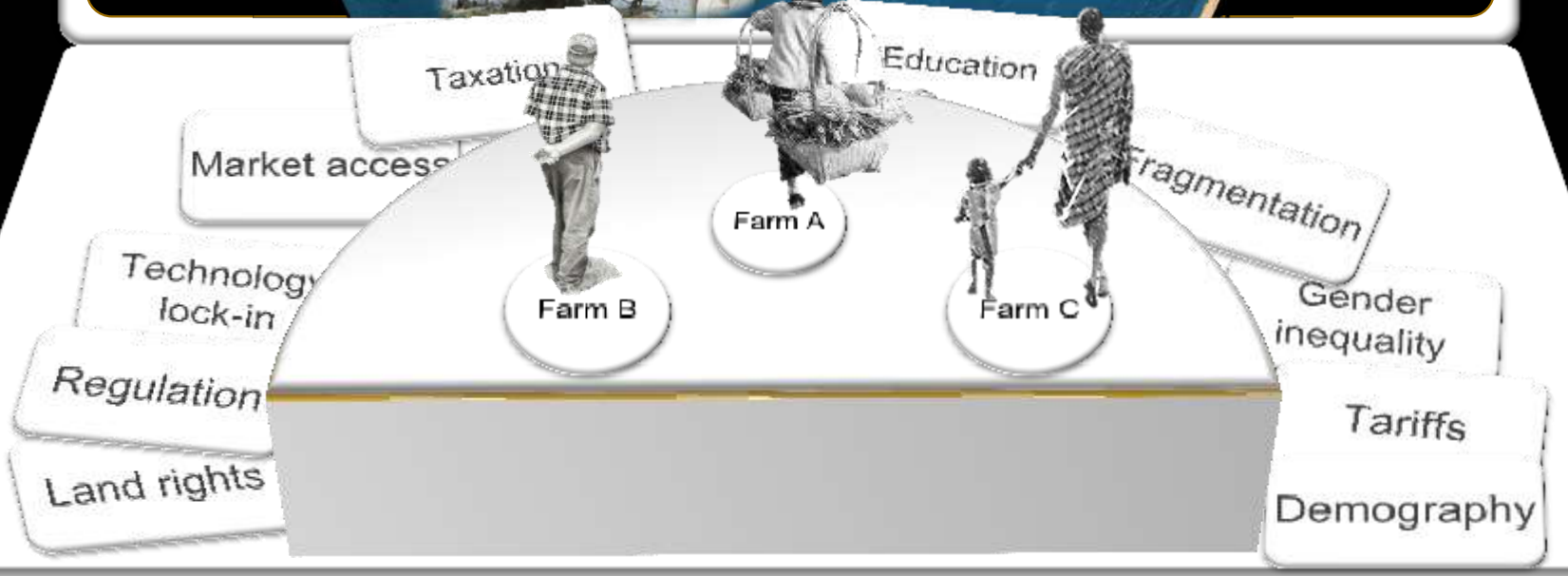
*Which food is needed,  
where, and by whom?*

*How can we close cycles?*

*How can we optimise  
(and govern) the global  
food system?*

*What kind of sustainability  
do we want?*





THE FOOD SYSTEM IS "LOCKED-IN"



Organic farming

Permaculture

Climate smart

Community / fair trade agriculture

Smart agriculture (Hi-tech / ITC)

Urban / vertical farming



Insect farming

# THE 2050 HORIZON



Organic farming

Permaculture

Climate smart

Community / fair trade agriculture

Smart agriculture (Hi-tech / ITC)

Urban / vertical farming

Insect farming



Farm B

Farm A

Farm C

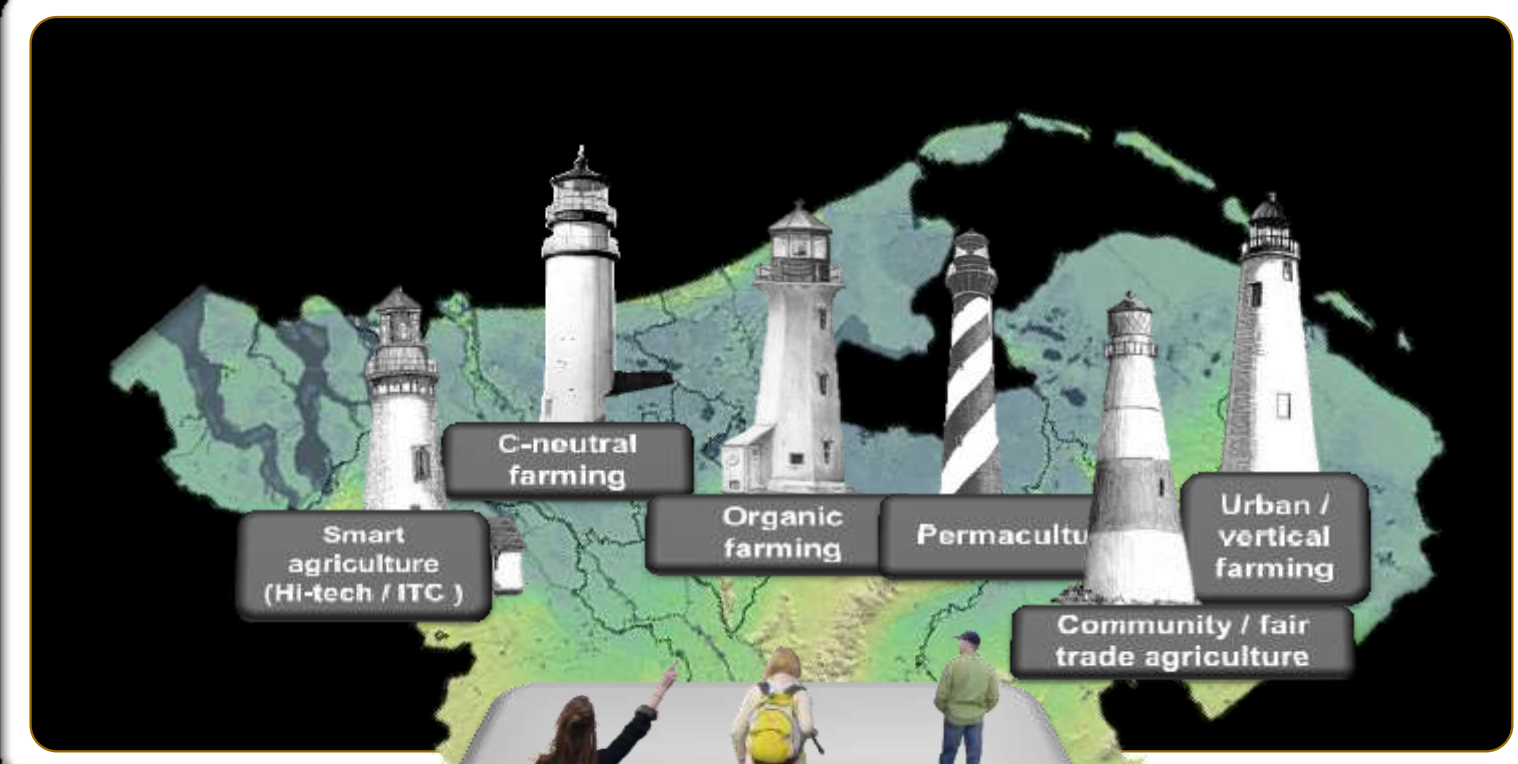
"Think" (design)

"Do" (facilitate)

Demography

The "think-do gap"

THE THINK-DO GAP



THE 2050 HORIZON