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Ecological Farming Group



Livestock production systems and future food security?

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Food security

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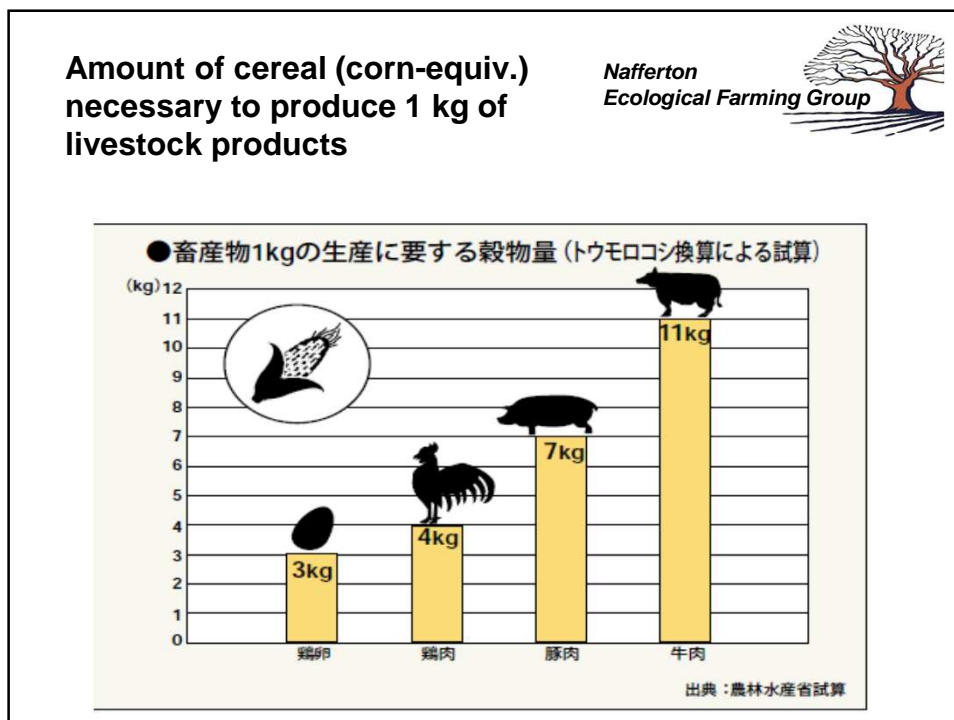
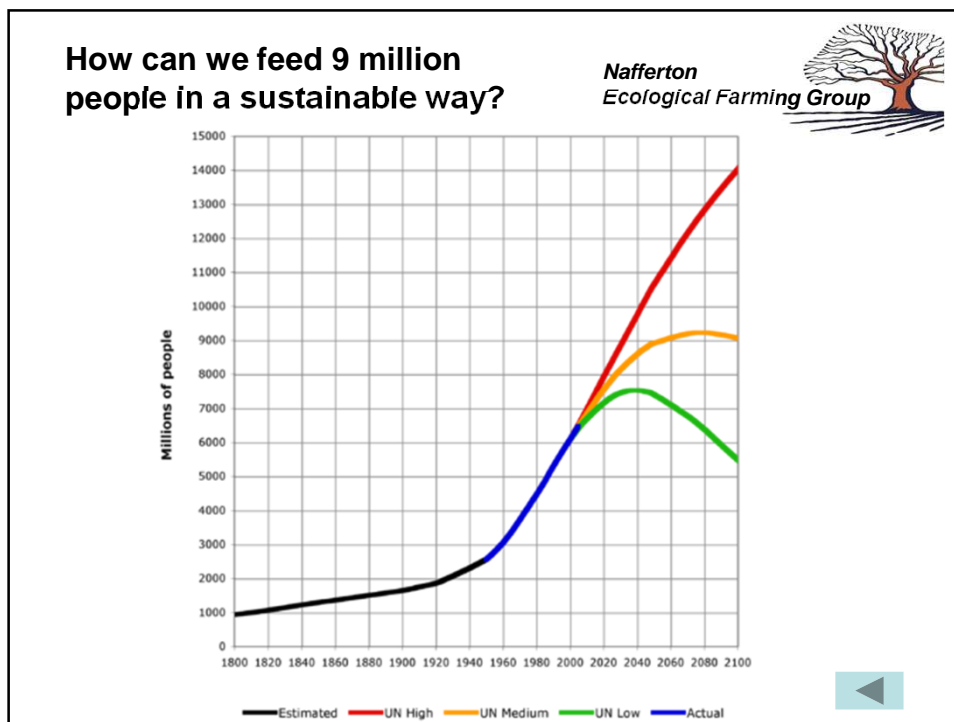
*“The ability to provide access to enough food of high quality for humans through **sustainable** methods of production, processing, storage, transport, distribution, trading and retailing”*

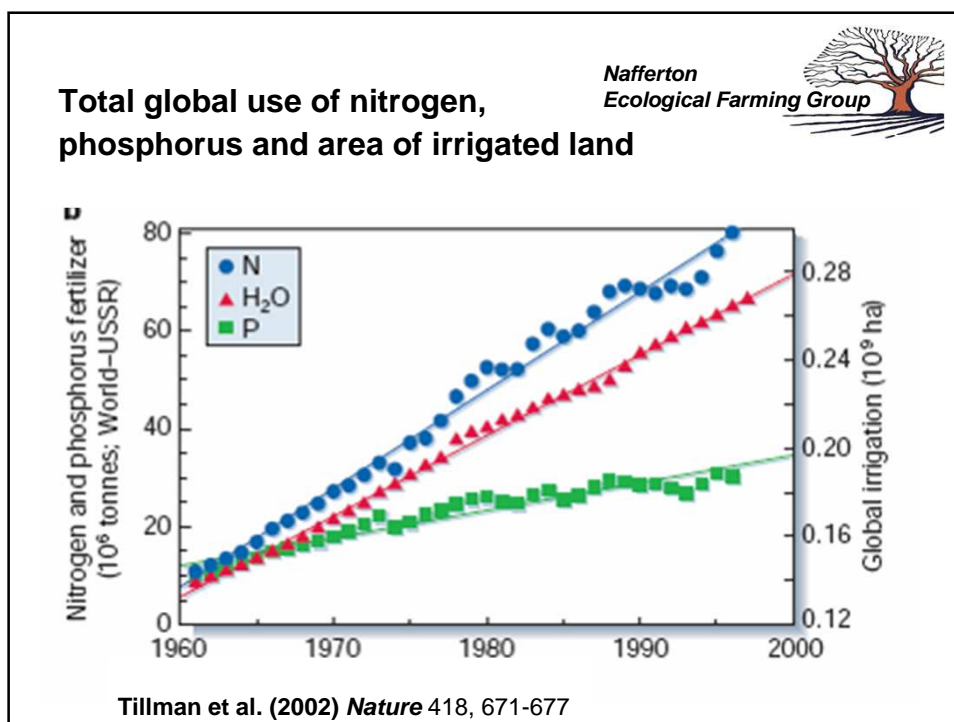
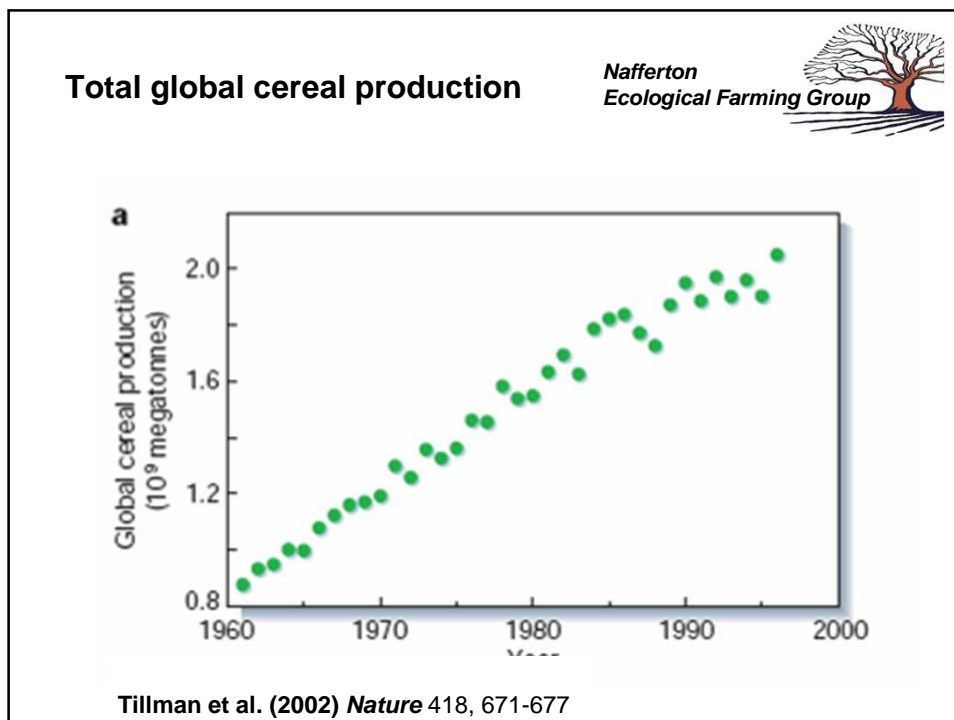
Sustainability in this context means without

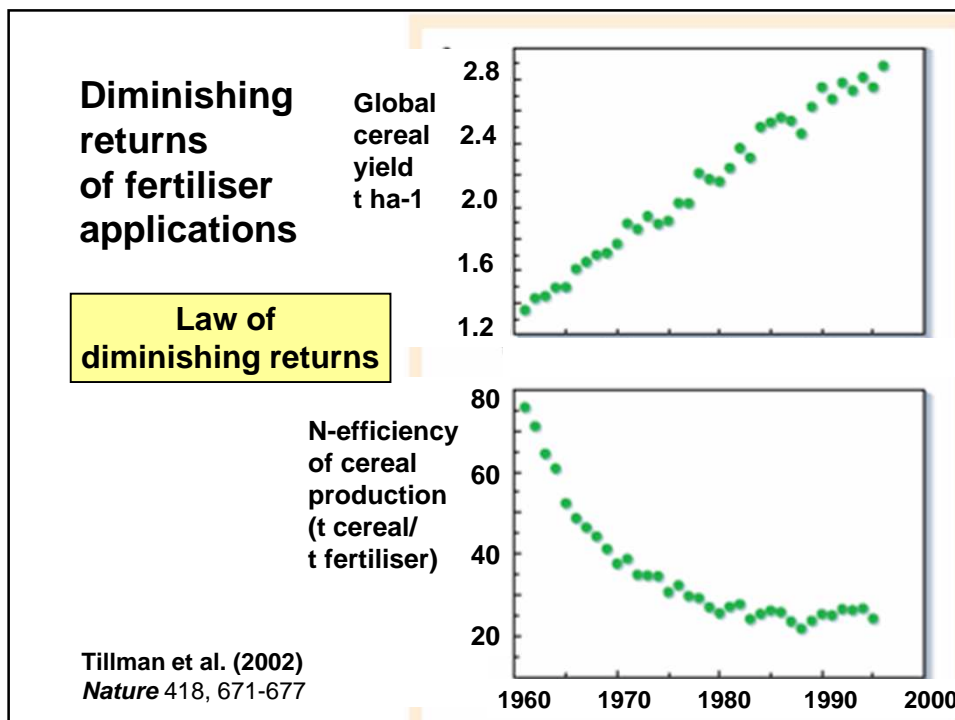
- negative impacts on the environment,
- reliance on non-renewable resources,
- an erosion of current ethical standards


while ensuring

- fair economic returns to all food chain stakeholders
- flexibility to meet the challenges of global change







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(Gellings and Parmenter 2004)

Energy requirement in agricultural system (world average) in KJ/kg

	Nitrogen	Phosphate	Potash
Production	69,530	7,700	6,400
Packaging	2,600	2,600	1,800
Transportation	4,500	5,700	4,600
Application	1,600	1,500	1,000
Total	78,230	17,500	13,800

Energy use – CO₂ emissions

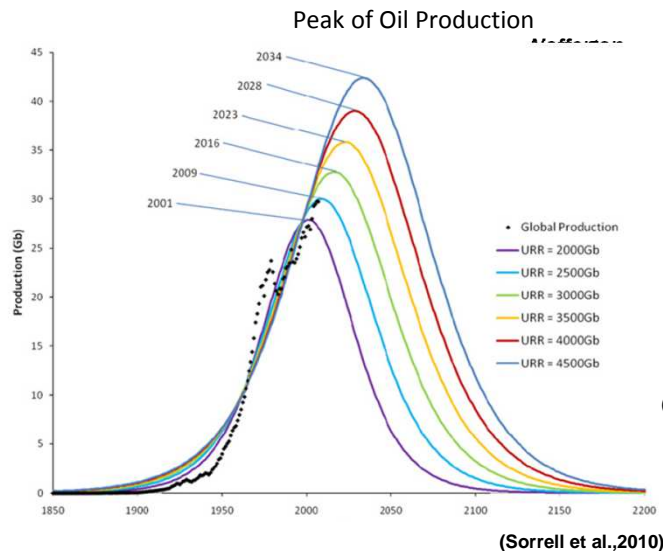
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Mineral N-Fertiliser

- 1 kg Nitrogen-fertiliser = 36,000kJ = 1 L fuel
- 1 kg nitrogen fertiliser (NH₃NO₃) results in
 = 2.38 kg CO₂ (equivalents of CO₂, CH₄ and N₂O)
- UK Farm level = 100 ha cereals x 200 kg N/ha/annum
= 20,000 Litre fuel used
= 47,600 kg CO₂ into the atmosphere
- European level = 11 Million t N/annum*
= 11,000 Million Litre fuel used

* Fertiliser Europe (2009) Annual Forecast 2009. www.fertilizereurope.com



Proven global reserve: **1,333Gb:**
45.7 years-consumption of 2009
 (BP, 2010)



When Will Phosphorus Run Out?

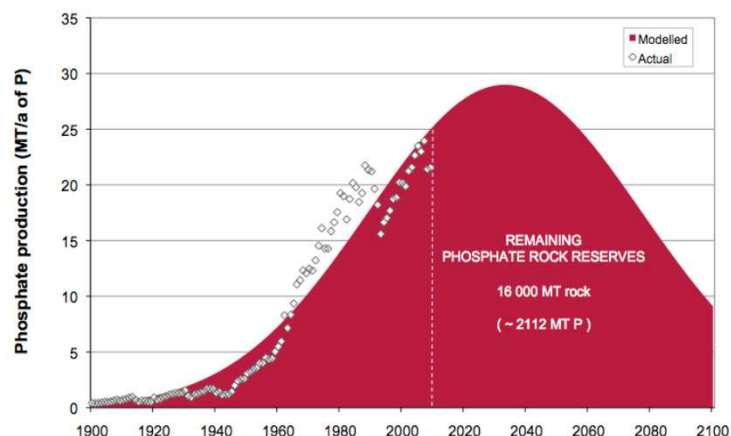
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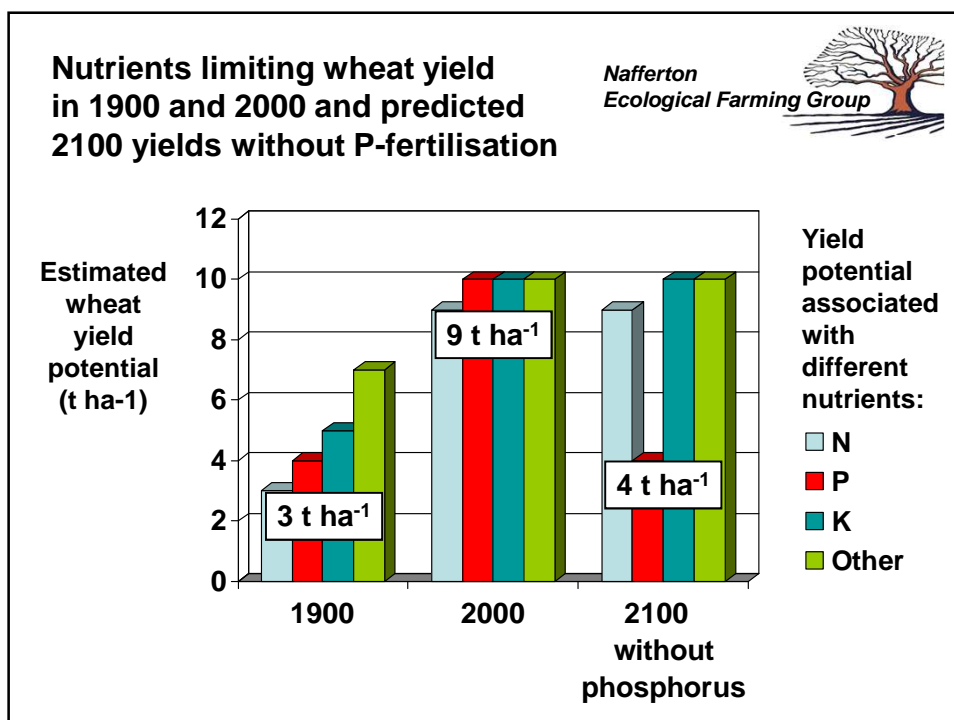
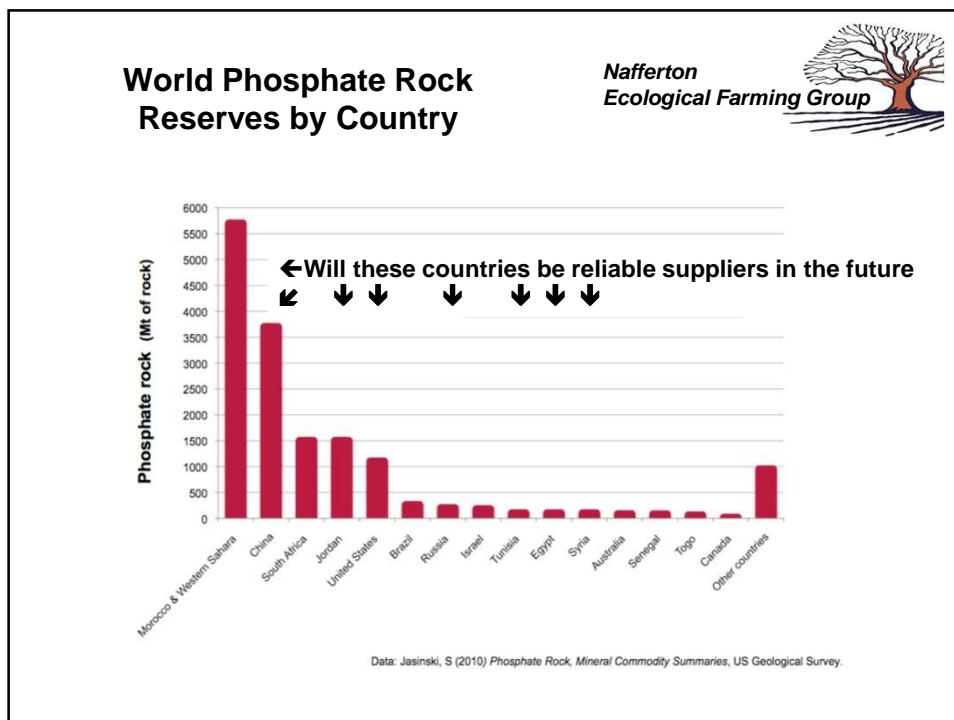
- Numerous scientific studies conclude that phosphorus (phosphate rock) reserves-resources will be depleted in the 21st century
 - Pessimistic: in 30-40 years
 - More optimistic: in 70-80 years
- IFDC (International Fertilizer Development Centre) prediction: 300-400 years
 - Figures disputed by the US geological survey
 - Does the fertiliser industry and its lobbying bodies just want business as usual?

Peak Phosphorus Curve

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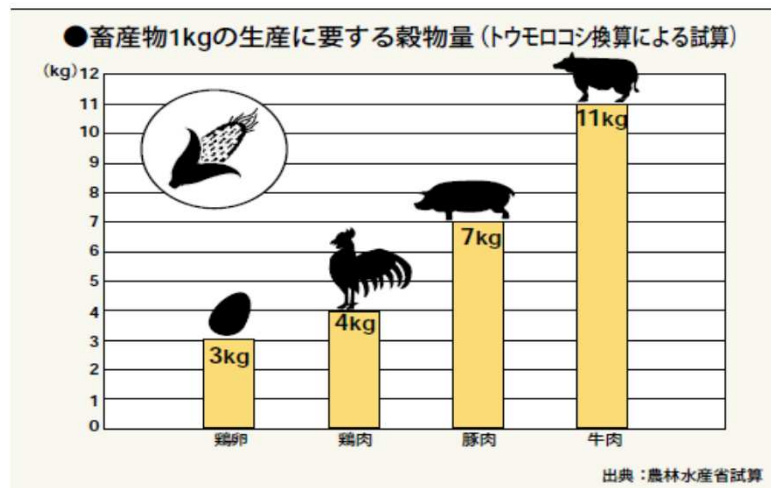


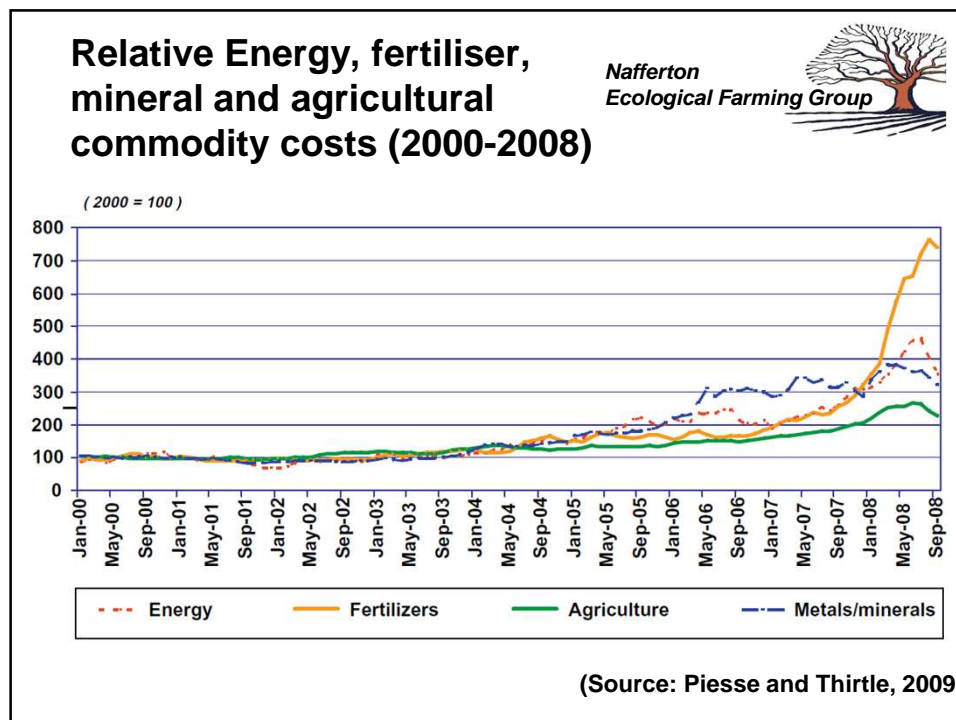
Source: Cordell, D, Drangert, J-O & White, S (2009) *The Story of Phosphorus: Global food security and food for thought*. Global Environmental Change, 19 (2), p292-305




What type and how much animal
production can we justify in the
future from a food security point of view?

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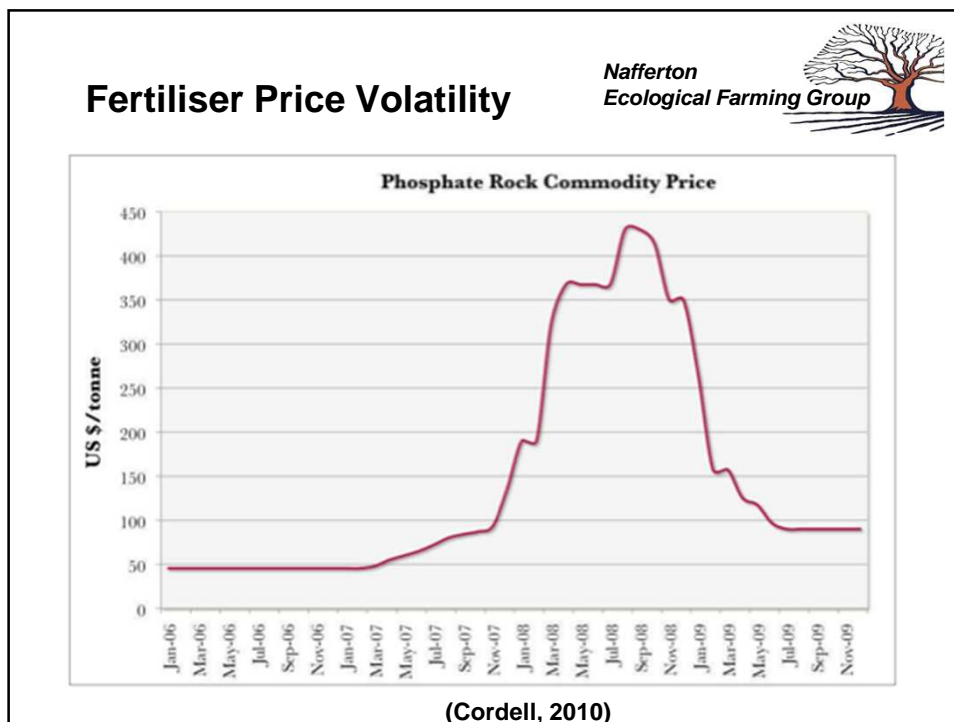
What are the solutions?

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The main approaches available are:

- 1. More efficient recycling** of NPK via
 - animal and green manures,
 - crop residues, food processing waste
 - communal and domestic organic waste
 - **human toilet waste/sewage**
- 2. Reduction of losses** of fertiliser from soils
- 3. Breeding/selection** of more nutrient (especially N and P) efficient crop varieties

EU NUE-CROPS project



Open Questions?

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Are there **enough organic fertilisers** and/or organic waste that can be processed and used as fertiliser available?

- Probably yes, if we get much more efficient in recycling organic waste
- **Probably not, if we apply current EU-organic farming standards**
 - **which currently prohibits the use of night soil/sewage as fertiliser**

