



**Greenhouse Gas fluxes in grazing livestock systems**

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**Outline of talk**

- Non-CO<sub>2</sub> GHG gases in context
- C cycle in grazed systems
- N cycle in grazed systems
- Estimated CH<sub>4</sub> emissions from two contrasting systems
- Estimated N<sub>2</sub>O emissions from two contrasting systems
- Compatibility of IPCC methodologies with C & N cycles






**Sources of GHG emissions from pastoral agriculture\* - life cycle analysis approach (LCA)**


**Carbon dioxide – electricity, lime applications, transport of feed & animals, fertiliser manufacture, other**

**Nitrous oxide – dung & urine deposited on pasture, dung & urine stored, pasture applied N fertiliser**

**Methane – enteric, faecal material deposited on pasture, stored animal wastes**

**\* Assuming no supplementary feed purchased off farm**




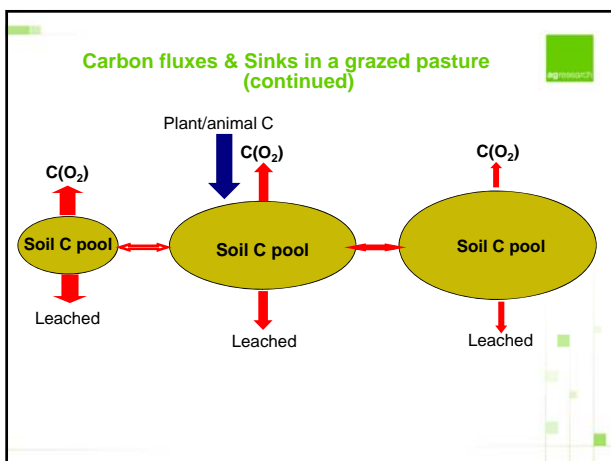
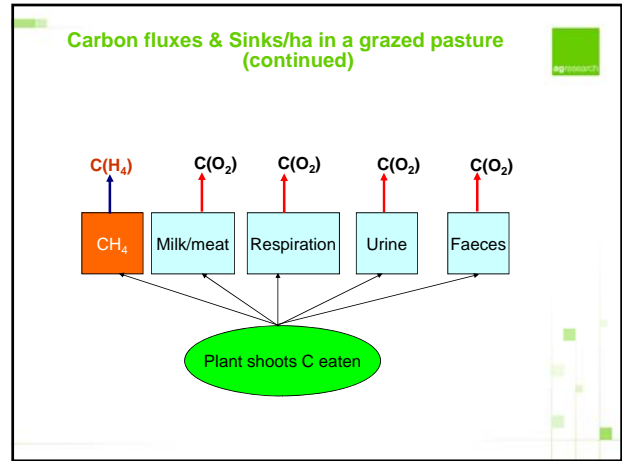
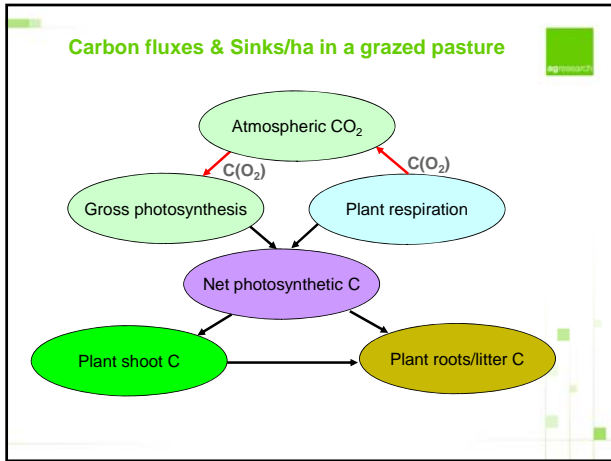


**Proportion GHG of emissions from pastoral agriculture by gas- life cycle analysis approach (LCA)**

	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O
% contribution to total emissions – CO <sub>2</sub> equivalent basis	9	61	30

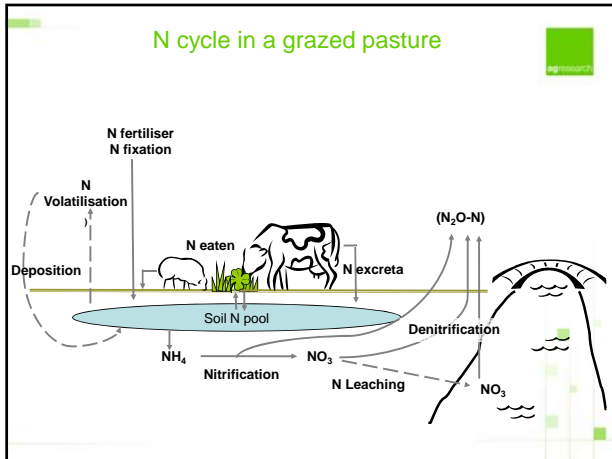
Source: Basset-Mens et al 2008, unpublished





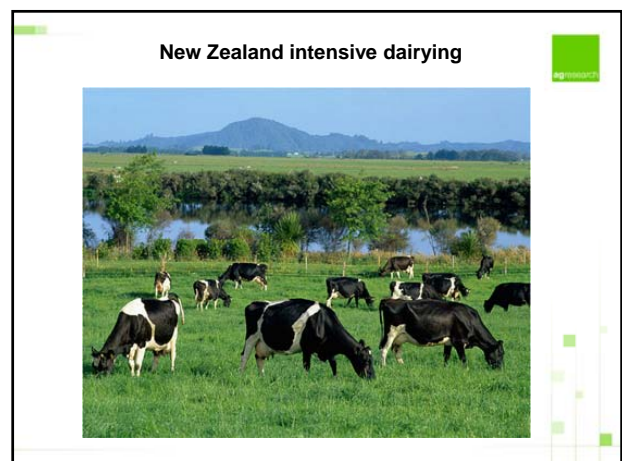
### Factors affecting determination of soil carbon accumulation

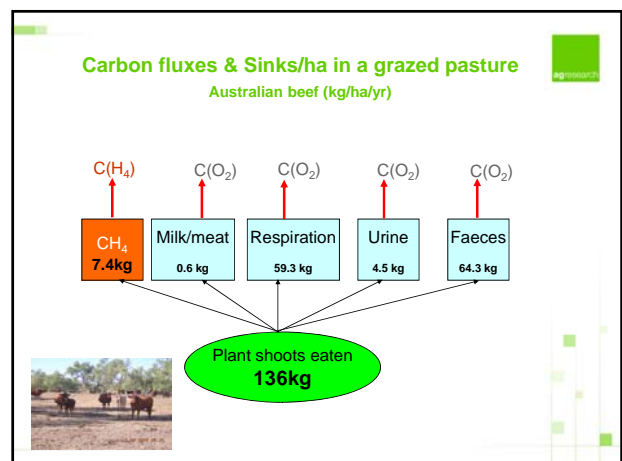
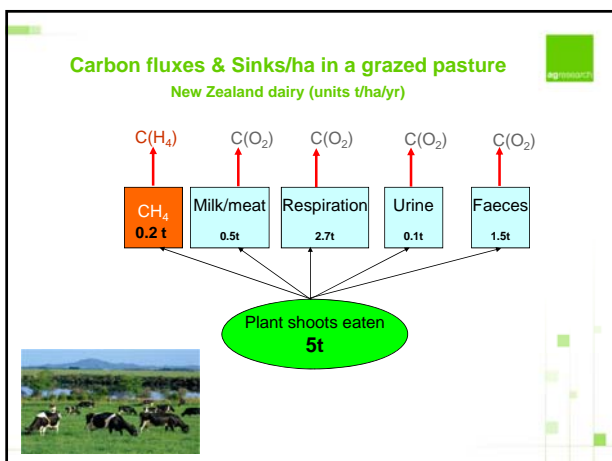
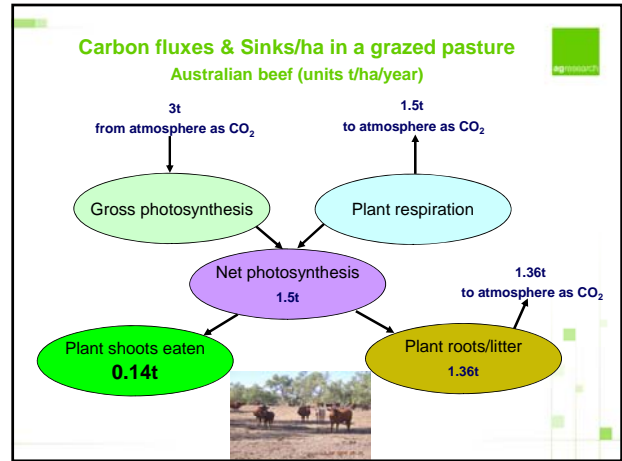
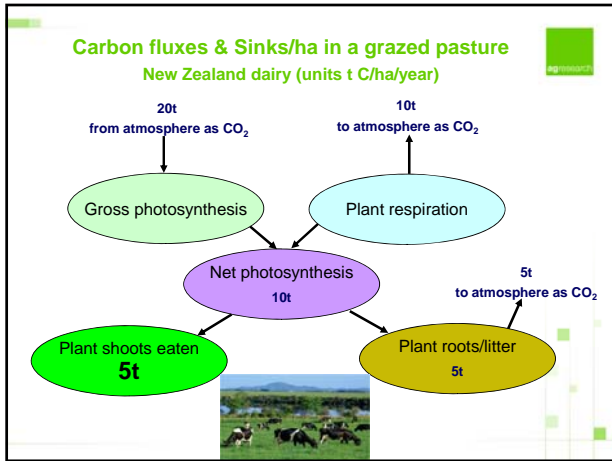
- Measurement issue
  - large C pool
  - high spatial variability
  - high temporal variability
  - changes in soil C over time small in relation to pool size
- Soil type
- Climate
- Grazing & nutrient management
  - IPCC approach – can claim credit for soil carbon storage under Article 3.4 ‘management’ but difficult to demonstrate changes in soil carbon accumulation over time
- Accounting issue ‘net –net’ accounting; what was rate of change in 1990?

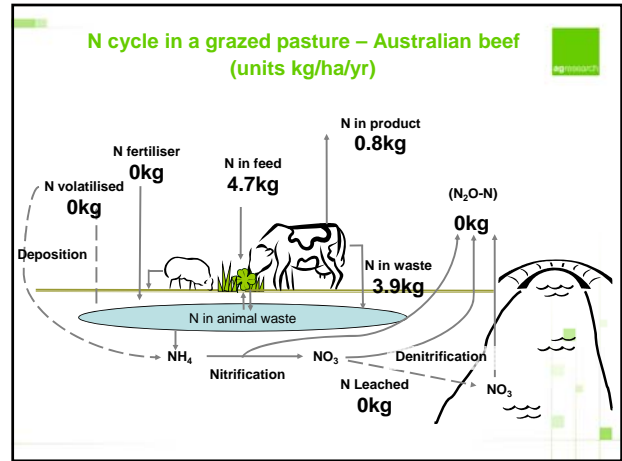
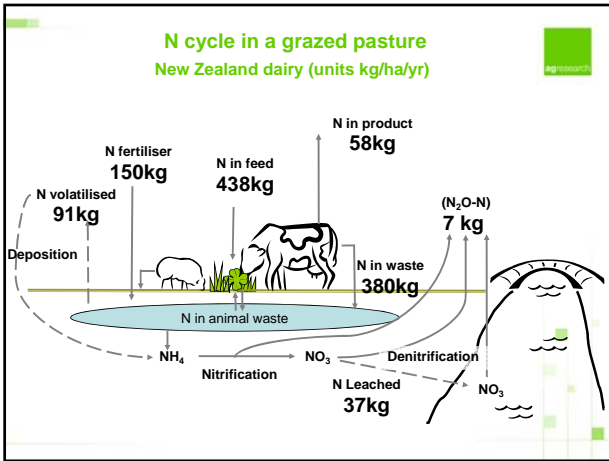


### IPCC accounting systems and the C & N cycles

- Need to be consistent with biological cycles
- Need to be able to capture individual circumstances
- Need to use readily available & verifiable (?) data
- Need to minimise uncertainty







### Compatibility of IPCC methodologies with C & N cycles

- IPCC Tier 2 CH<sub>4</sub> methodologies are broadly consistent with C cycle
- Estimation of soil C changes present a difficult challenge and lack of credit for increases in soil carbon are a cause of concern to farmers
- IPCC Tier 2 N<sub>2</sub>O methodologies are consistent with the N cycle
- Boundary issues also a concern to some eg who should take responsibility for C loss in product

