

BE WHAT YOU WANT TO BE

# Evaluating opportunities for greenhouse gas offsets from the grazing sector in Australia

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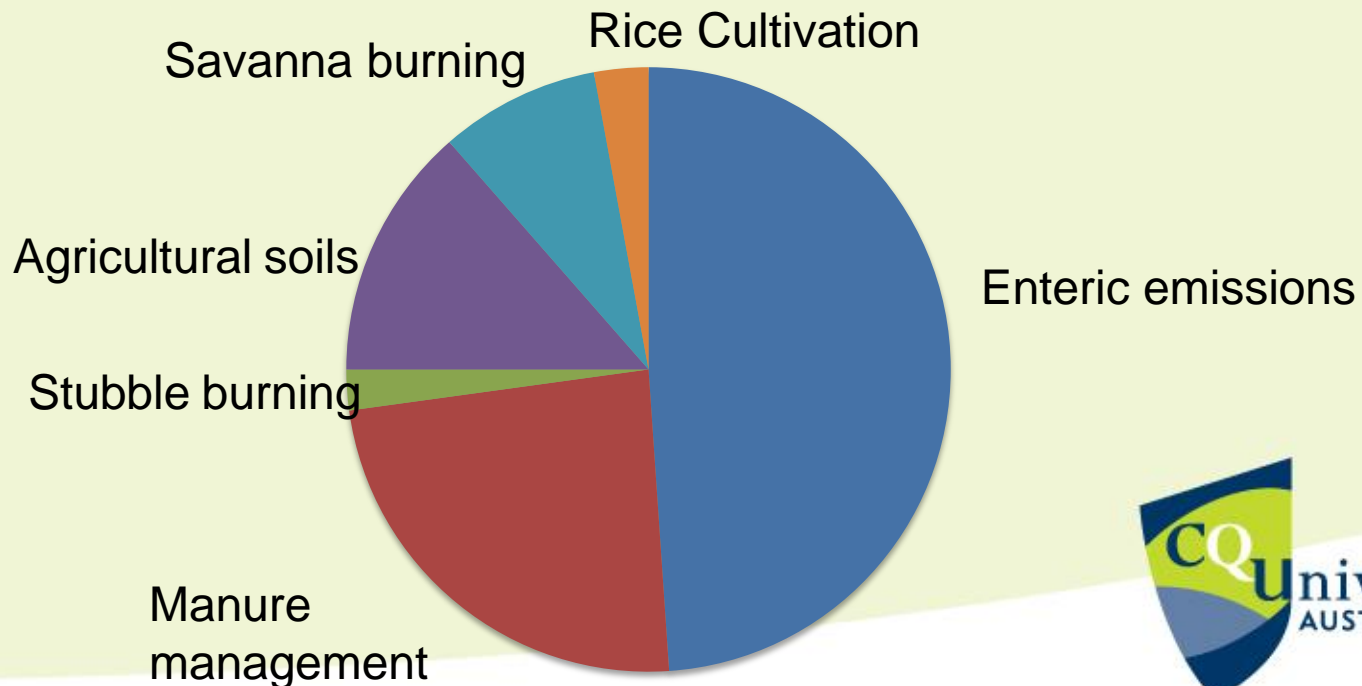
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# Introduction

- Agriculture is responsible for approximately 16% of total CO<sub>2</sub>-<sup>e</sup> emissions
- Enteric emissions from livestock account for most of this



# Enteric (methane) Emissions

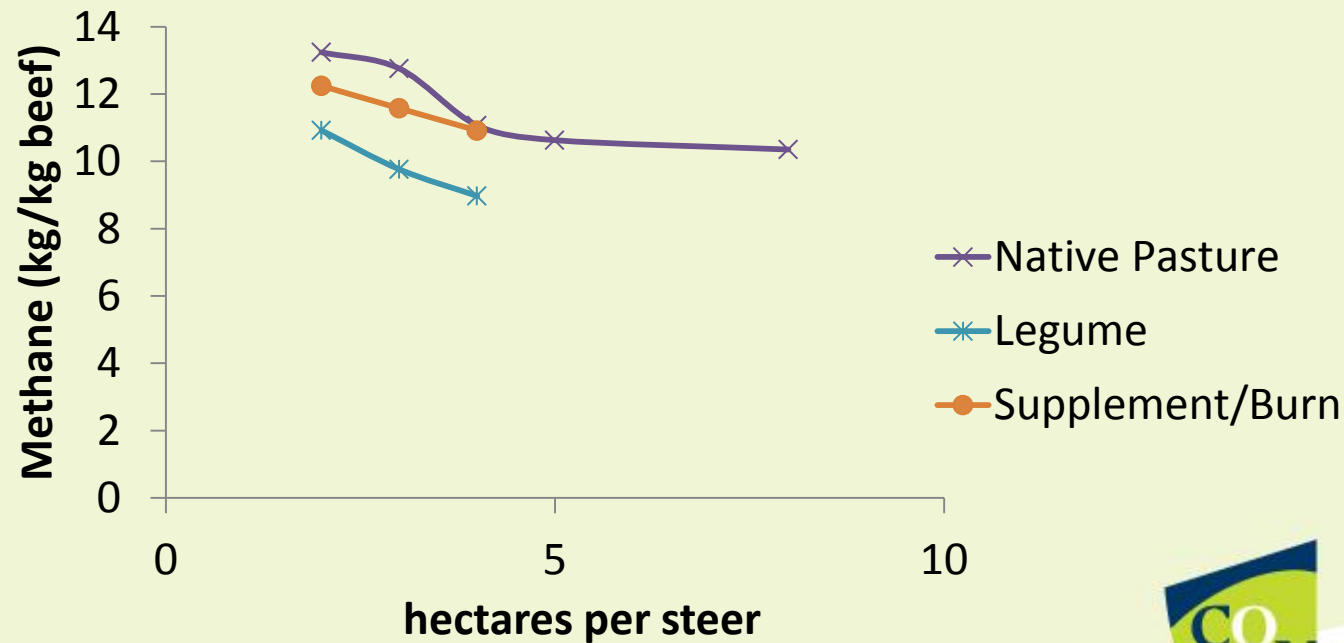
- Waste product of digestion
- Influenced by age, genetics, diet quality
- Reducing livestock production would reduce enteric emissions
- But production may simply shift elsewhere ('leakage')
- Reducing emissions intensity (i.e. emissions per unit of production) avoids leakage issue

# Northern beef industry

- Contributes  $\approx 11\%$  of total agricultural emissions
- Options to reduce emissions intensity ( $\text{CO}_2\text{-e}/\text{kg}$  beef)
  - Optimise stocking rates
  - Improve diet quality
  - Lower age of turnoff
  - Feed additives

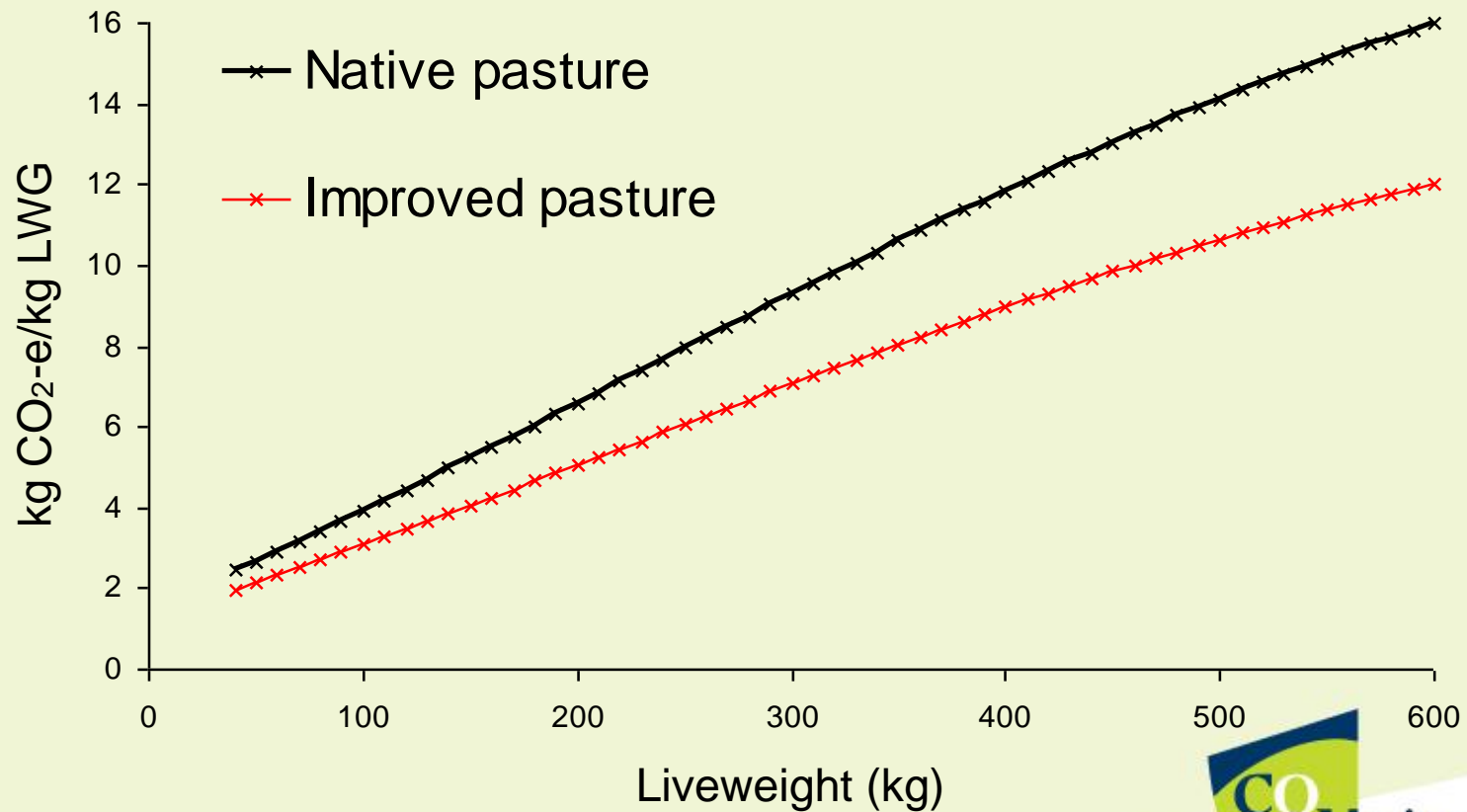
# Optimising stocking rates

- Optimal stocking rates  
= reduced emissions intensity  
& better economic returns (Burrows et al 2010, O'Reagain 2011)



# Improved pastures

- Emissions intensity lower on higher quality diet



# Improved reproductive efficiency

- Weaning rates average less than 60% across many northern regions
- Increasing weaning rates by 10%, reduce emissions intensity by 11%
- Cost is highly variable but increased weaning should increase profitability in the long run

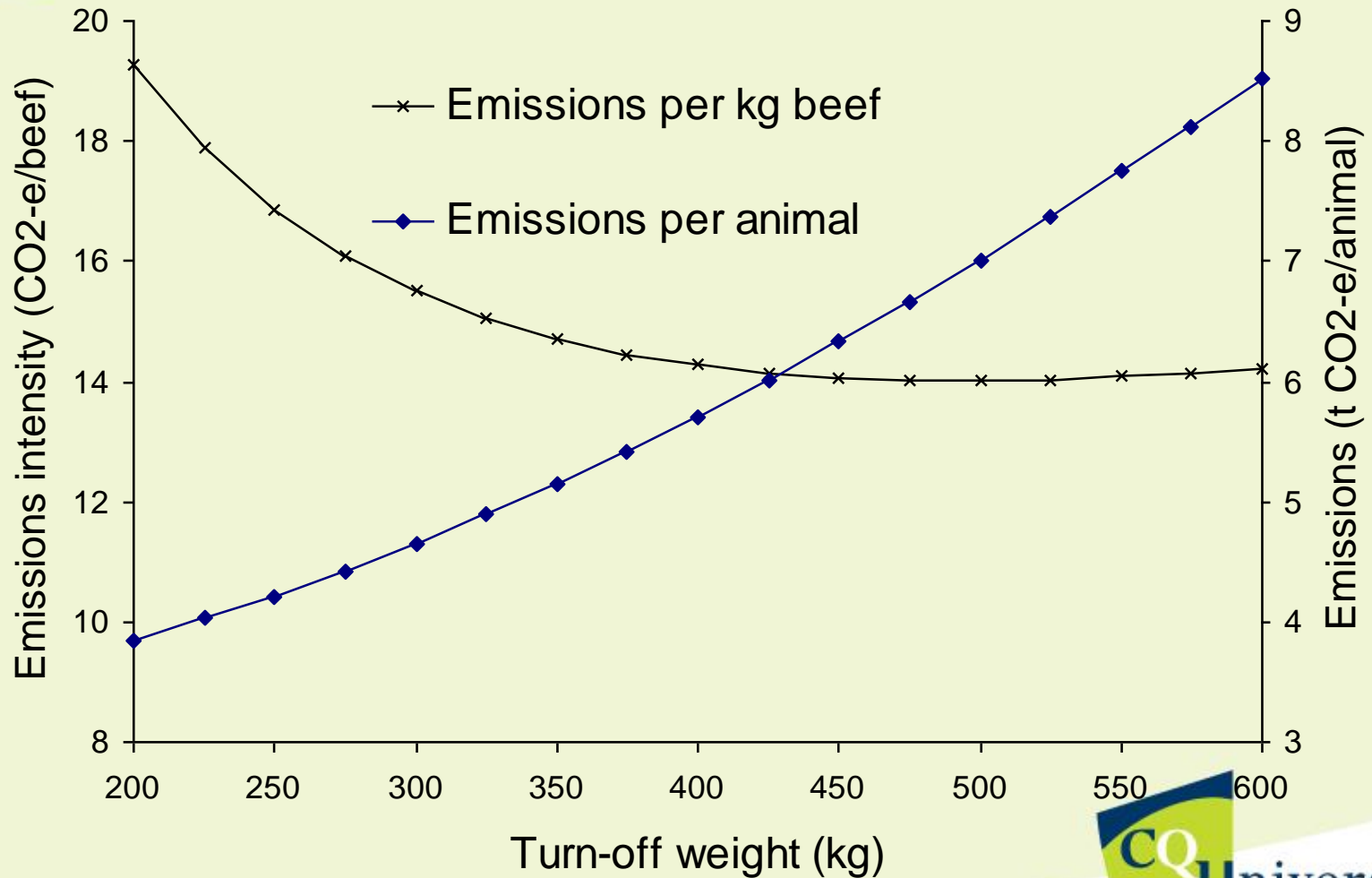
# Feedlotting

- Grain diet in feedlots leads to higher growth rates and lower emissions intensity
- Feedlot finishing for 130 days could abate 2.6t of CO<sub>2</sub>-e from enteric fermentation per animal, compared to achieving the same weight gain on native pasture
- This would cost approximately \$60/t of CO<sub>2</sub>-e abated (depending on grain price)
- Extra emissions from grain production and transport <0.1t

# Early turnoff

- Animals aged 1-2years emit 68% CO<sub>2</sub><sup>-e</sup> /kg beef as those aged 2-3years (Rolfe 2010)
- Early turn-of may reduce emissions intensity as growth: maintenance ratio is higher for younger animals
- But a larger breeding herd is required
- Optimal turn-off age depends on breeding rates and growth rates

# Early turnoff



# Feed additives, vaccines

- Oils, tannins, monensin alter rumen conditions, reducing emissions intensity in livestock systems
- Mostly very expensive (>\$100/t of CO<sub>2</sub>-e) method of abating emissions
- And not very practical in extensive grazing systems...
- Anti-methanogen vaccine – still science fiction!

# Sequestration Options

- Destocking
- Regrowth management

# Destocking

- Reduced enteric emissions
- Increased carbon in pasture/litter
- Fire?
- Soil carbon?
- Biodiversity?

# Regrowth management

- Reduced land clearing already contributed to meeting Australia's Kyoto targets
- Half of continued clearing is regrowth  
Reduced regrowth clearing (strips)  
 $\approx 3\text{Mt/yr}$  @  $< \$5/\text{t}$  (Donaghy et al 2009)
- Longer clearing cycles increase average carbon levels by  $\approx 35\%$  for Brigalow and  $\approx 42\%$  for eucalypt @ negative cost

# Carbon offsets for the northern beef industry?

- Need to focus on emissions intensity as well as overall emissions (to avoid leakage)
- In many cases emissions could be reduced at negative cost through better management
- To generate additional offsets there may be potential to intensify production in some systems (feedlots, improved pasture), coupled with reductions elsewhere (on poorer pasture)
- Also potential for increased sequestration

# Further research

- Baselines for emissions and sequestration on different landtypes/production systems
- Improved measurement systems to reduce transaction costs