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THE UNIVERSITY OF MELBOURNE

Greenhouse gas mitigation from feeding nitrate in an Australian beef farm, a partial life cycle analysis

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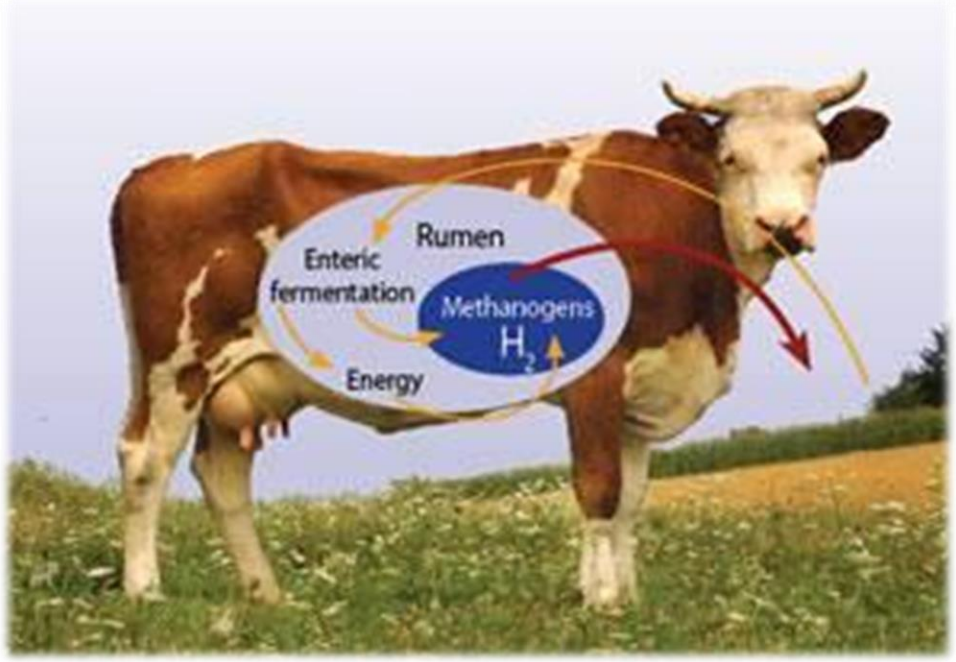
Abstract 29044

Background: Urea supplementation

- Pastures in northern Australia are nitrogen deficient
- Urea is a source of non-protein nitrogen (NPN)
- Nitrate is an alternative source of NPN

Background: enteric methane

- Methane is a potent greenhouse gas
- There is pressure on the agriculture industry to reduce methane emissions from cattle
- Enteric methane production is also a dietary inefficiency
- Theoretically, energy saved from methane production should be able to be used by the animal to support production



Background: decreasing enteric methane

Nitrate

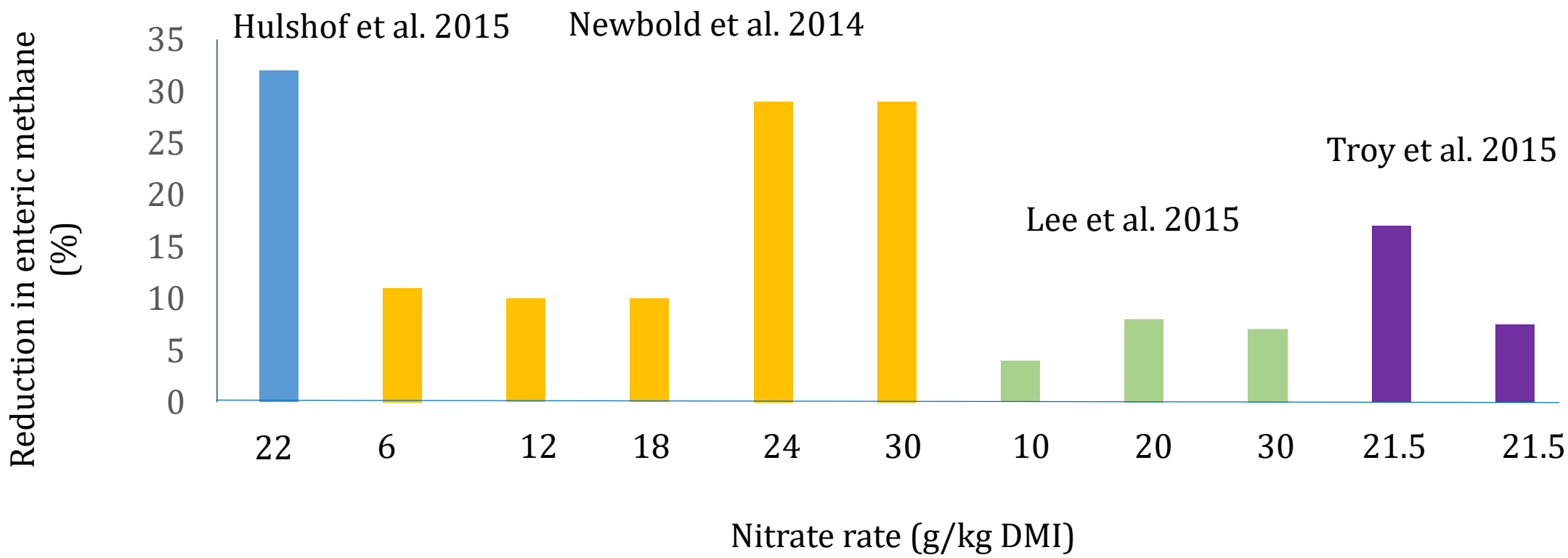
- Nitrate is reduced to ammonia in the rumen
- This reduction has great affinity for hydrogen

NO_3^- Nitrate

NH_3 Ammonia

- Reduction of nitrate to ammonia uses hydrogen that would otherwise be available for methane production

What has been done



Background

- The Australian carbon offset method recommends feeding nitrate to cattle at a maximum rate of 7 g/kg dry matter intake.

- Reducing enteric methane will not always result in a net decrease of greenhouse gases from the entire farm, due to the potential increase in other sources of GHG emissions.

Aim

To calculate the effect of nitrate on whole farm greenhouse gas emissions of an Australian beef farm

Partial LCA Model

Beef GHG accounting framework

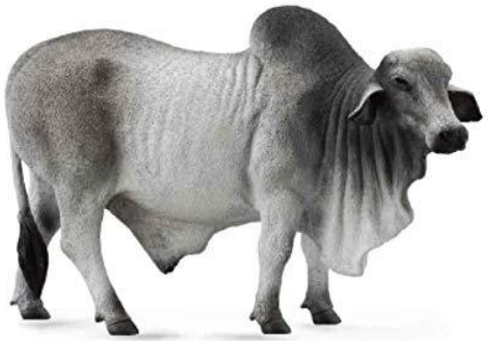
1206

Enteric methane

-9%

Case study farm

21

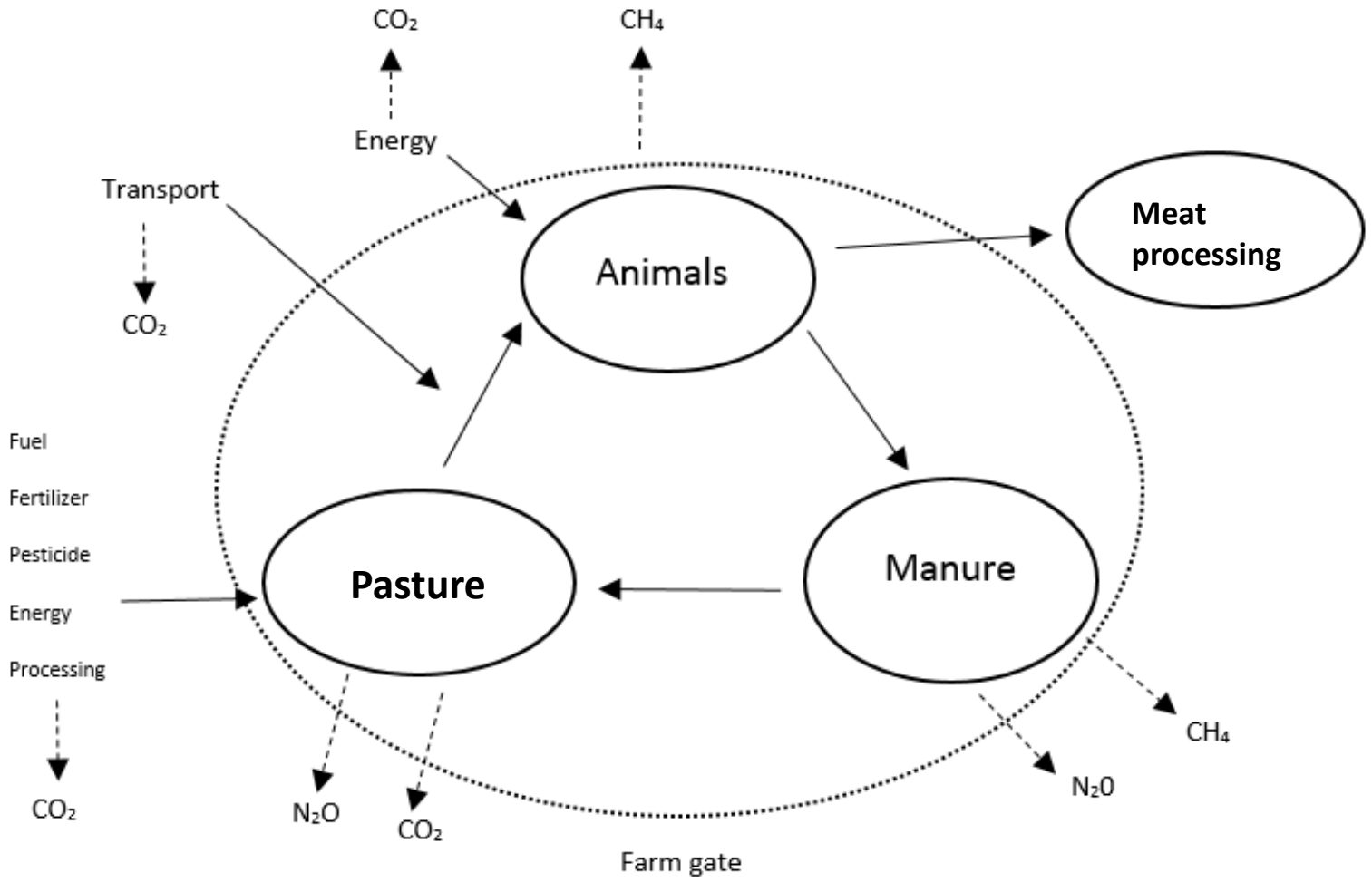


Nitrate at 7g/kg DMI

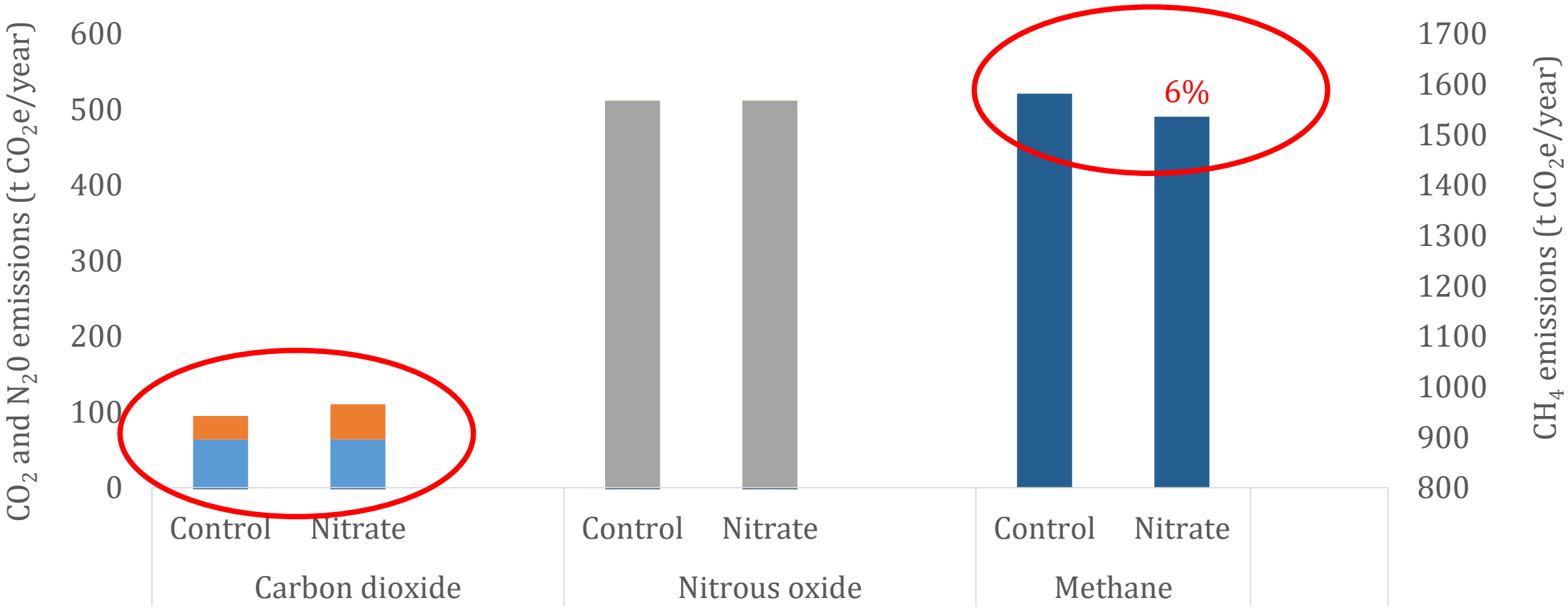
18 months; live weight 370 kg

Partial LCA Model

Beef GHG accounting framework



Results



Whole farm greenhouse gas emissions were reduced by 4%

Aim 2: Is there profit in reducing methane from beef cattle by feeding nitrate?

Carbon credits

- In Australia, businesses can generate Australian carbon credit units (ACCU) and then sell the credits to generate revenue.

- One approved method is the feeding nitrate to beef cattle

Potential Profit: Average Carbon Price

$11.82/t CO_2e abated

- Gross revenue

$1,100.43/year

$2.90/animal finished/year

Potential Profit: Average Carbon Price

$11.82/t CO_2e abated

- Break-even cost of nitrate $0.007/kg
- Price of nitrate in lick blocks in Australia $5.44-5.85/kg nitrate (Cottle et al. 2016)

Conclusions

- Feeding nitrate can make a contribution to reducing whole farm greenhouse gas emissions.

- Under current conditions, use of nitrate as an offset method was not profitable and modifications to the offset method would be required to incentivise its use in the Australian beef industry.

Thank you!

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