



CARING  
FOR  
OUR  
COUNTRY

Project No: RRRD055

Ruth Chalk, QLD Dairyfarmers' Organisation

Industry extension & communication Coordinator: Rick Kowitz, QDO

Beverley Henry, QUT



Australian Government  
Department of the Environment, Water, Heritage and the Arts  
Department of Agriculture, Fisheries and Forestry





CARING  
FOR  
OUR  
COUNTRY

## Summary of Issue

- N & P inputs to intensive dairy systems (feed, fertiliser) are high and exceed outputs in milk, crops etc.
- High N applications (eg fert. urine) result in loss through nitrate leaching and volatilisation
- ~ 85% Qld dairy farms apply N as urea but up to 50% is lost before uptake by plants
- N loss through various pathways is not well characterised for GBR dairy farms
- Effectiveness and cost/benefits of nitrification inhibitors on urea fertilisers (Entec) in reducing N loss and improving productivity is not known





CARING  
FOR  
OUR  
COUNTRY

## Project objectives

- Determine if N leaching losses from dairy pastures can be reduced if conventional urea fertiliser applications are combined with a nitrification inhibitor.
- Determine if run-off losses of sediment, N and P can be reduced if conventional urea fertiliser applications are combined with a nitrification inhibitor.
- Assess the cost/benefits of using urea coated with a nitrification inhibitor compared to standard urea in terms of water quality benefits and farm productivity.
- Extend learnings from the on-farm research to the wider industry through field days and publications.

Review/modify the industry current recommended practices as a result of the findings, and to determine priorities for investment.



Australian Government  
Department of the Environment, Water, Heritage and the Arts  
Department of Agriculture, Fisheries and Forestry





CARING  
FOR  
**OUR**  
COUNTRY

# Approach: Team, Methods

Name	Organisation	Role
Ruth Chalk	QDO	Project Manager, MERI
Rick Kowitz	QDO	Coordination, industry extension & communication
Peter Grace Beverley Henry	QUT	Research Leader Research coordination
Paul Nelson	JCU	Researcher
Michael Bird	JCU	Researcher
Tony Webster Rob Dwyer Neale Price Cathy Phelps Nick Drew	CSIRO Incitec Subtrop. dairy DA FIFA	Research advisory committee & Industry Communication





CARING  
FOR  
OUR  
COUNTRY

# Geographic scope

## Two irrigated dairy farms

- Site 1: Atherton Tableland - Ravenshoe School Farm
- Site 2: Burnett Mary – Roddau farm, Gympie
  - Preliminary plan – 2x2 factorial experiment with 2 fertiliser rates x 2 inhibitor treatments (+ or – Entec)
  - Measurements include rainfall, runoff, pasture production, leaching, N balance & gaseous loss, soil data.



Australian Government

Department of the Environment, Water, Heritage and the Arts

Department of Agriculture, Fisheries and Forestry





CARING  
FOR  
OUR  
COUNTRY

## Outputs

- Quantified runoff and leaching losses of N at 30 and 45 kg N/ha (as urea)
- Impact of a nitrification inhibitor coating on the urea fertiliser (Entec) on N runoff and leaching loss
- Full N balance for soil, plant and water fate of fertiliser N in commercial dairy farms based on rainfall, irrigation and soil baseline data and measured leachate, runoff, gaseous loss (including with  $^{15}\text{N}$  tracer)
- Cost-benefit analysis for nitrification inhibitor treated urea
- Extension activities for dairy farmers (field days, publications etc)
- Dairy industry recommended practices modified by QDO for GBR catchments





CARING  
FOR  
OUR  
COUNTRY

# Synergies – Reef Rescue & external

- Reef Rescue – preliminary
  - RRRD020 *Mineralisation of N within sugarcane cropping*
  - RRRD049 *Minimising off-farm movement of N in N Qld bananas*
  - RRRD010 *Factors affecting adoption of practices that have water quality benefits in GBR catchments*
  - RRRD016 *Developing metrics for water quality in the GBR*
- External – preliminary
  - DAFF Nitrous Oxide Research Program
  - Dairy Australia, NSW DPI *Coastal NSW dairy catchments runoff*
  - Dairy Moving Forward – Dairy N use efficiency & loss





CARING  
FOR  
OUR  
COUNTRY

# Management Implications

- Simple calculator to be developed based on difference in efficiency (IF significant) between urea and Entec urea fertilisers will enable farmers to determine gross margins (\$/ha)
- Current recommended practices and investment priorities for the GBR catchments to be reviewed and modified based on the findings of the research





CARING  
FOR  
OUR  
COUNTRY

# End user engagement & delivery

- Qld Dairy NRM Program coordinated field days x 4
- Fact sheet explaining the research
- Wider communication through:
  - Industry media
  - Publications (including peer reviewed papers)
  - Websites



Australian Government

Department of the Environment, Water, Heritage and the Arts

Department of Agriculture, Fisheries and Forestry

