The impact of irrigation management and N rate on N uptake and lint yield in irrigated cotton

John Smith, Wendy Quayle, Carlos Ballester Lurbe, James Brinkhoff, Anika Molesworth, John Hornbuckle

John Smith, Water and Irrigation, NSW DPI, Yanco

Objective

- To develop sustainable broadacre irrigation systems that increase the profitability and flexibility of irrigated farming systems.
  - Plant interactions
    - Quantifying NUE according to irrigation opportunity time, soil moisture, soil-plant N status and fertiliser N response.
  - Hydrology
    - to develop irrigation design criteria that allow precise application of water in basin irrigation layouts, such as bankless channel systems.
  - Collaboration, partnerships, extension

Maximising on-farm irrigation profitability

- The team
  - **NSW DPI:** John Smith, Sam North, Don Griffin, Alex Schultz, Rob Hoogers, Peter Regan
  - **Deakin University:** Wendy Quayle, John Hornbuckle, Carlos Ballester Lurbe, James Brinkhoff, Anika Molesworth
  - **IREC:** Iva Quarisa
  - **Grower Groups:** IREC, SG and ICC
  - **Extension:** LLS (Riverina and Murray), Rice Extension, CottonInfo

Collaboration, partnerships

- Three key learning sites established with the three grower groups

Cotton

Plant Interactions - Cotton (IREC)

- Objective
  - To determine the impact of irrigation management and N rates on N uptake and lint yield
  - To determine the impact of irrigation management and N rates on N fertiliser recovery

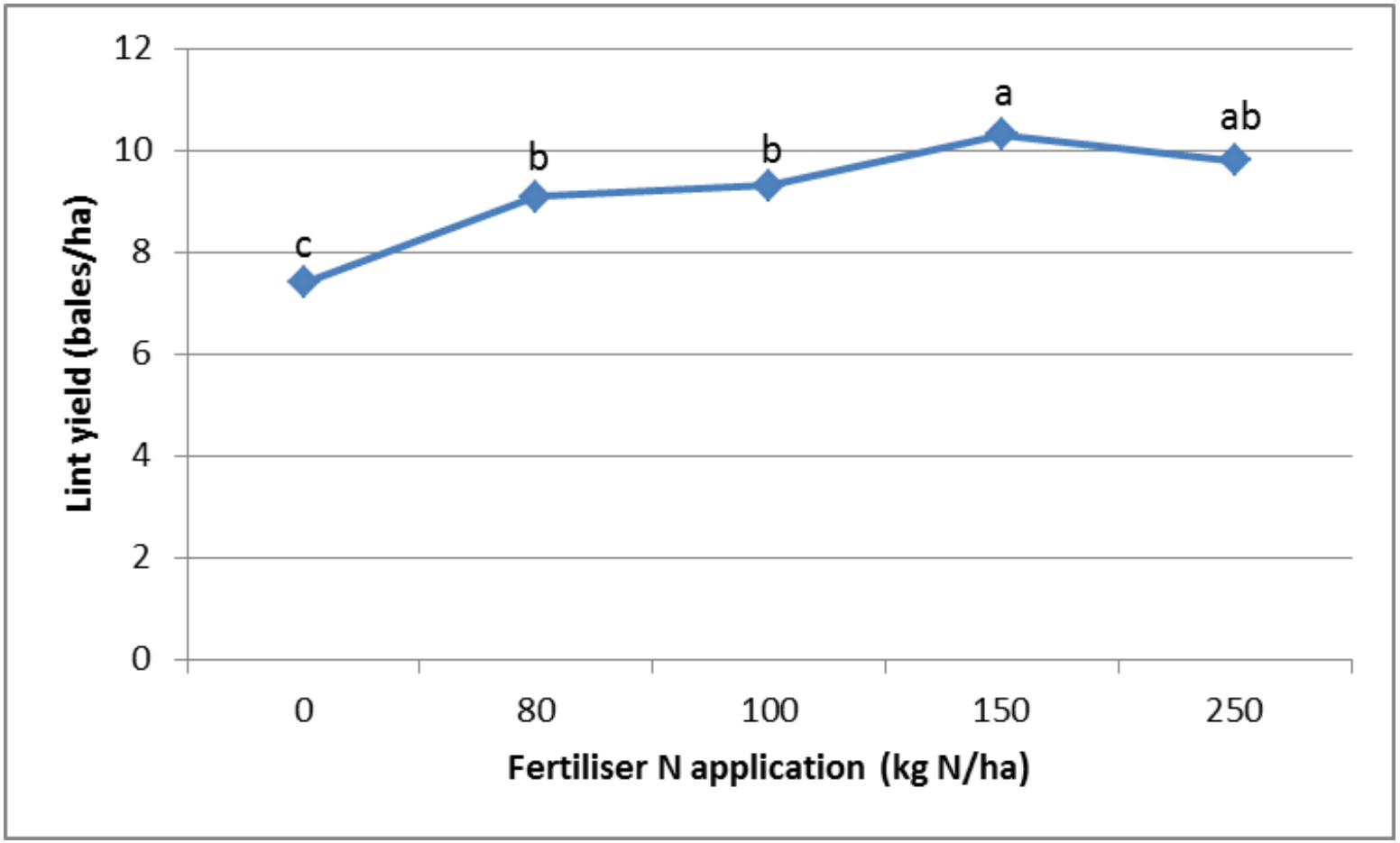
Experiment details

- Whitton IREC field station
- 5 N rates (0, 80, 100, 150, 250) all upfront
  - Site N 1.2 – 17 mg/kg (0-30cm)

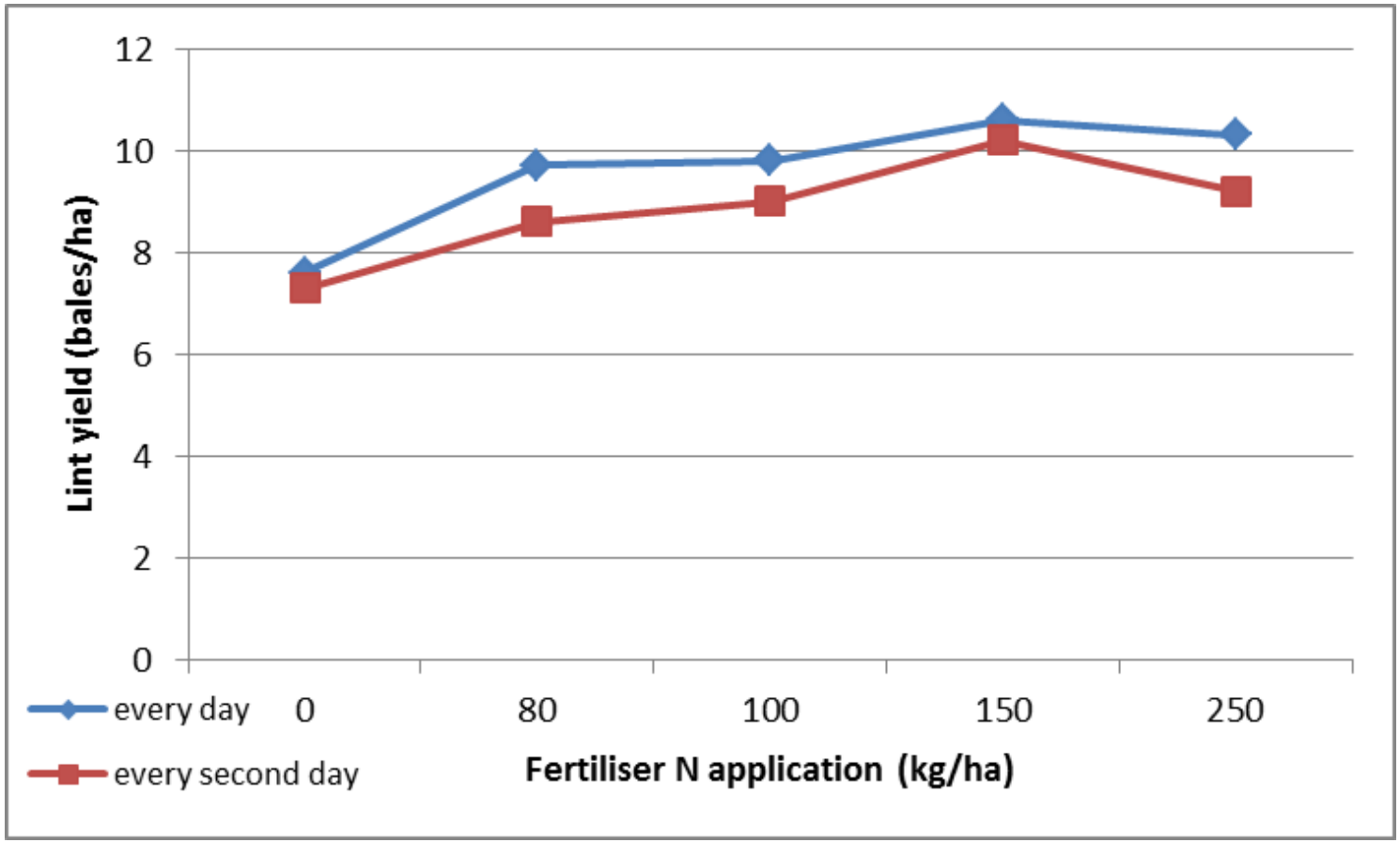
Experiment details

- Watered up with siphons, and one irrigation in-crop
- Two irrigation treatments; applied FF – FCB
  - every day, every second (Sub-surface drip)
  - Every day received 1.4 ML
  - Every second day received 1.7ML
- Crop N uptakes FF, FCB & Defol. (Results reported are Defol.)
- Hand picked and hand ginned.

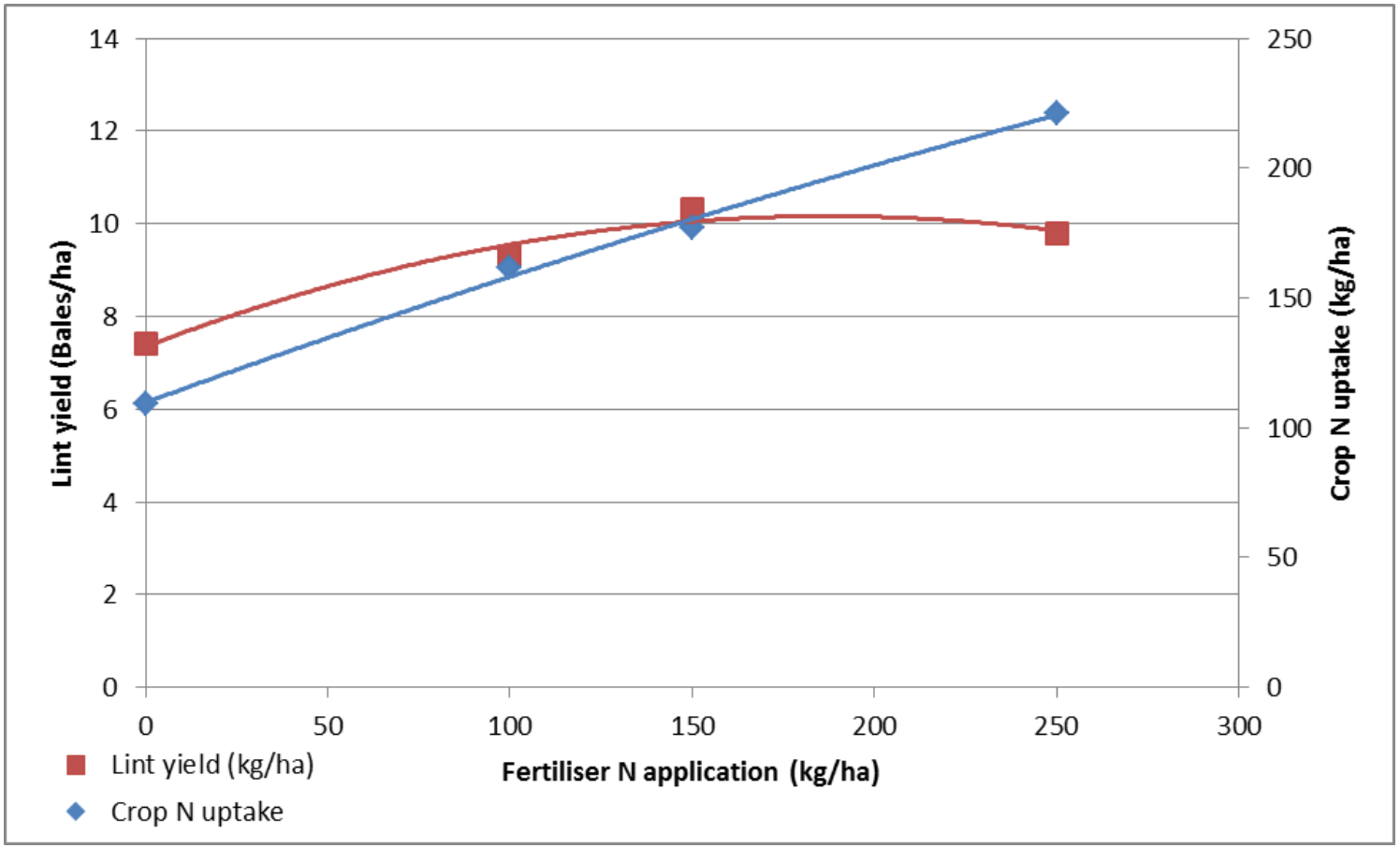
Results - Lint yield



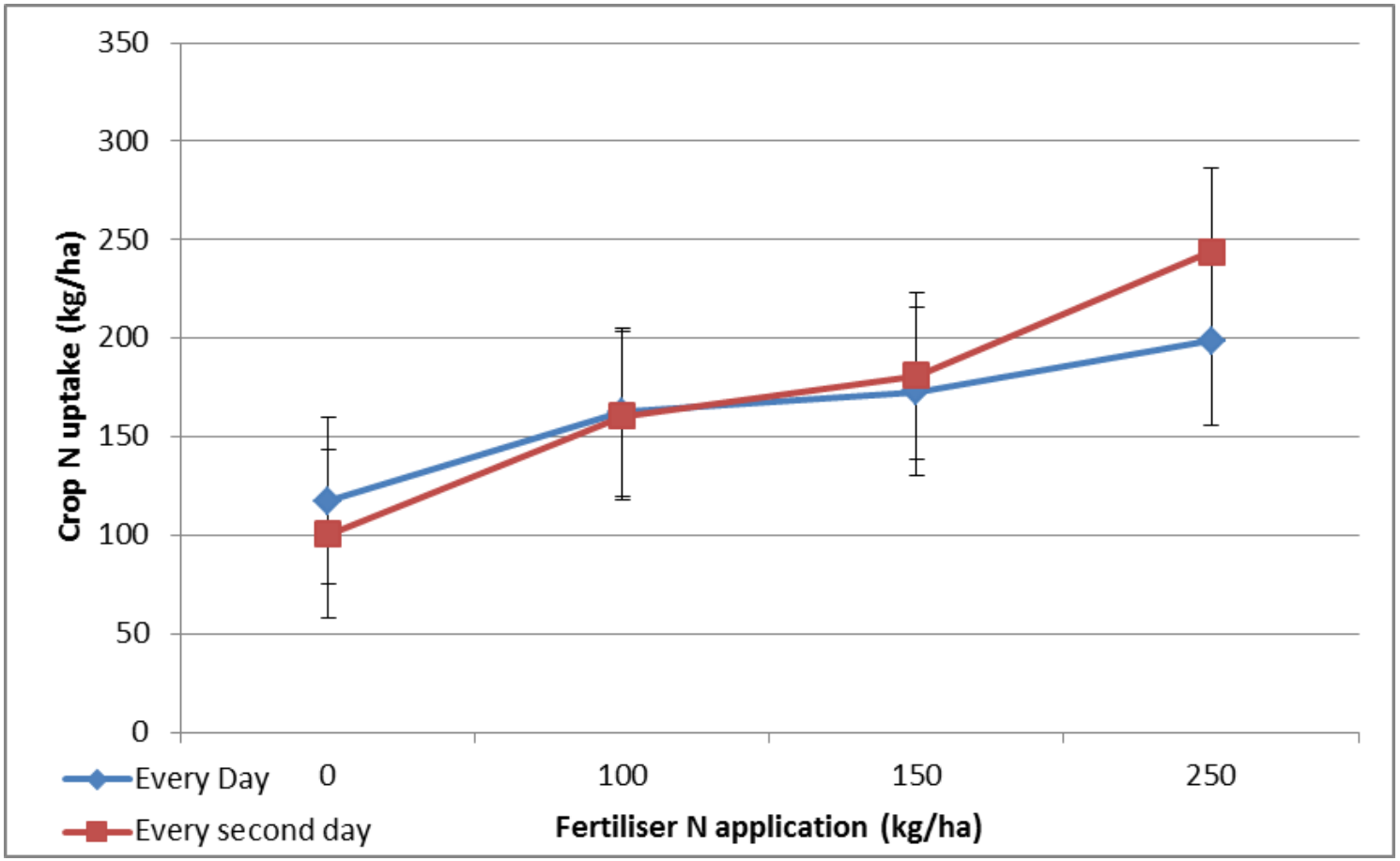
Results - Lint yield



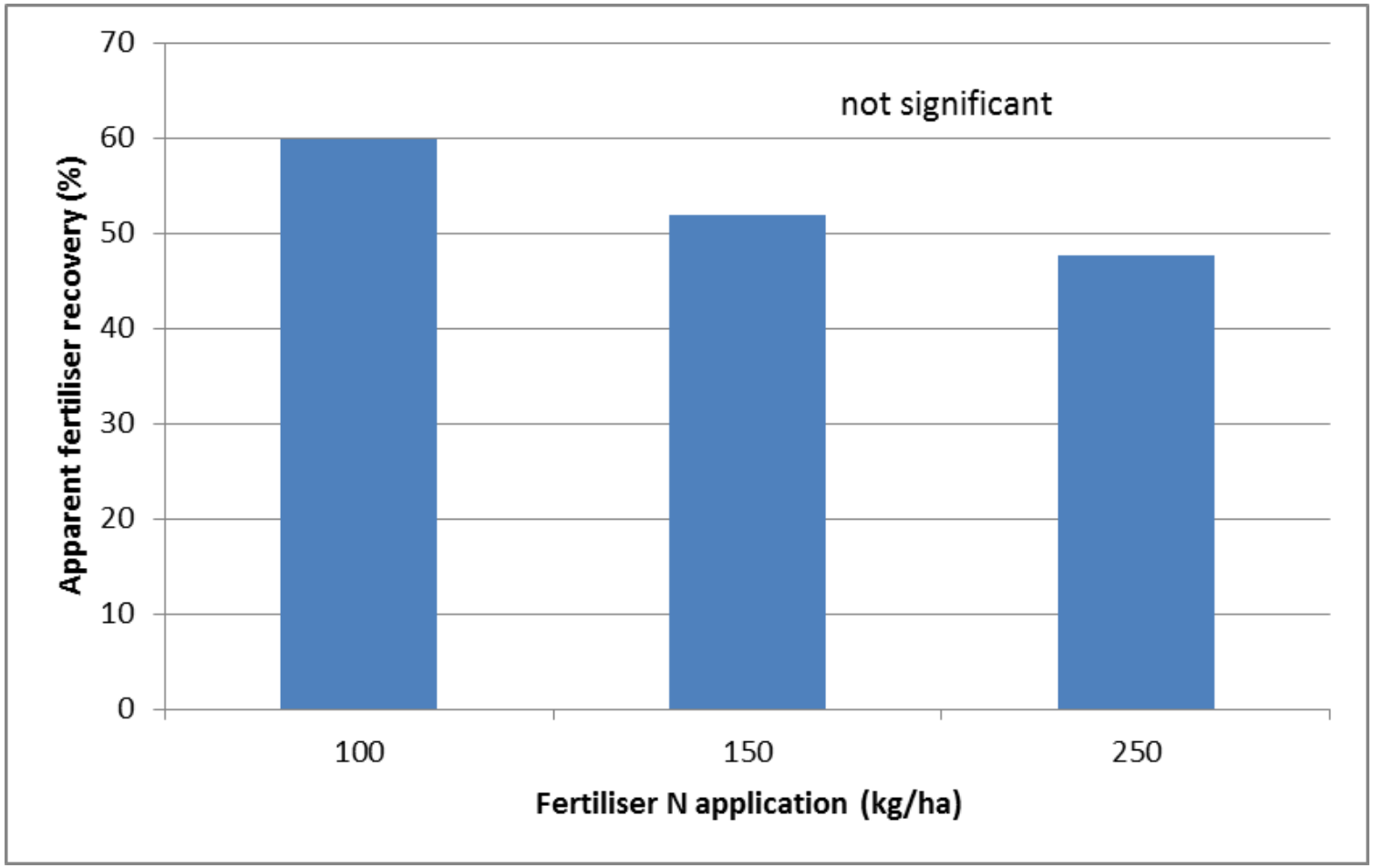
Results – N uptake



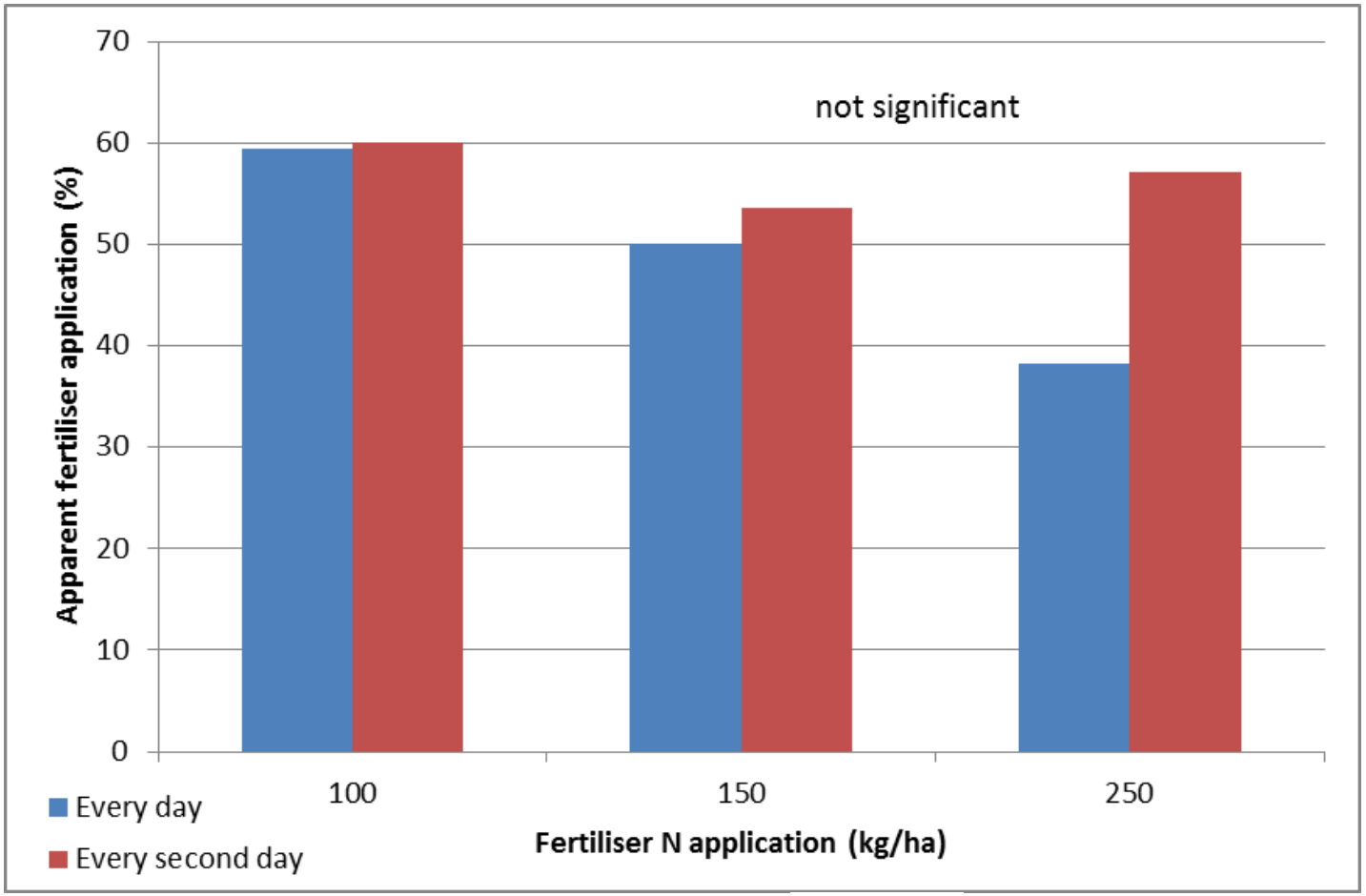
Results – N uptake



Results – Fert. recovery



Results – Fert. recovery



Summary

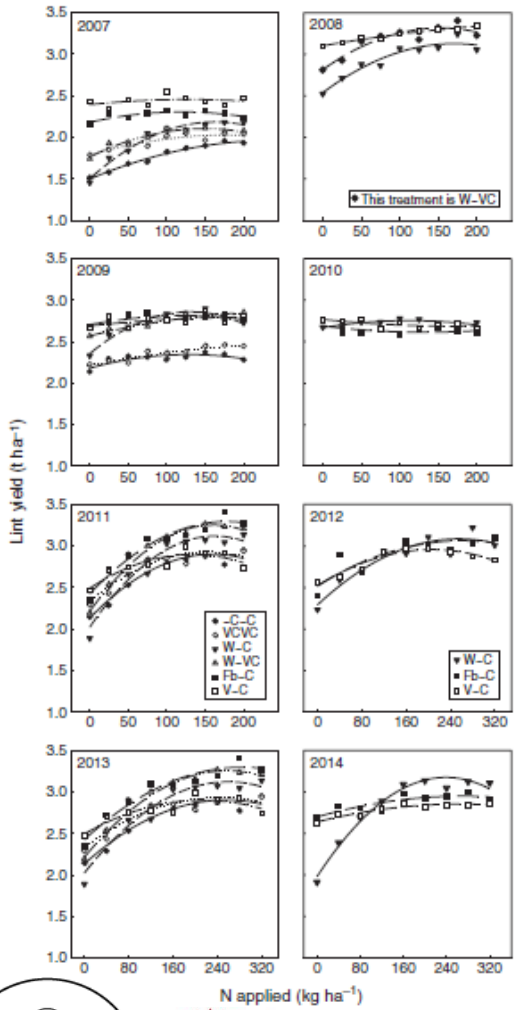
- To determine the impact of irrigation management and N rates on N uptake and lint yield
  - Irrigation influenced lint yield
    - Every day higher than every second
  - Irrigation did not influence crop N uptake
  - N rate influenced both
    - 150 applied N = maximum yield
    - Increased N = increased uptake (not more yield)

- To determine the impact or irrigation management and N rates on N fertiliser recovery
  - 53% apparent fertiliser recovery, declining with increase N

2016/17 plans

- Will be continued over the next couple of seasons

- Irrigation schedule and N rate influence on lint yield and N uptake in surface irrigated systems



Acknowledgements

- IREC – Stott farming; James Hill, Matt Watson and staff

- Technical staff – Aydin Enez, Esther van Meeuwan, Gabby Napier, Hannah Draper, plus other Deakin staff

- The project is supported by funding from the Australian Government Department of Agriculture and Water Resources as part of its Rural R&D for Profit Programme, the Cotton Research and Development Corporation and the Rural Industries Research and Development Corporation.

- Equipment Investment

The impact of irrigation methods and management strategies on nitrogen fertiliser recovery in irrigated cotton in southern NSW

John Smith, Research Officer Irrigation

Mike Bell, Shu Fukai

The University Of Queensland AUSTRALIA

QAAFI Queensland Alliance for Agriculture & Food Innovation

Australian Government
Cotton Research and Development Corporation

Working together with the Queensland Government
Queensland Government

CRDC funded scholarship

- Project:
  - The impact of irrigation methods and management strategies on nitrogen fertiliser recovery in cotton
- Three aims in the study
  - Determination of the impact of different irrigation systems on NUE in irrigated cotton
  - Investigation of alternate irrigation practices that increase fertiliser N recovery from irrigated cotton
  - Determination of the impact of alternate fertiliser practices and product types on the recovery of fertiliser N in irrigated cotton

2016/17 plans

- N rate responses over different irrigation systems
  - Systems with differences in watering times
  - 4 sites planned (Stott, Shaw, Witham, Gardiner)

- Influence of enhanced efficiency fertilisers on N uptake and lint yield
  - Urea, ENTEC, ESN and Agromaster (different release patterns)
  - 1 site, Tubbo irrigation

Thank you