New Zealand Agricultural and Resource Economics Society (Inc.)

THE IMPACT OF MANAGEMENT CHANGES DESIGNED TO REDUCE DISCHARGES TO WATER ON FARM PROFITABILITY AND ENVIRONMENTAL OUTCOMES

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Paper presented at the 2007 NZARES Workshop, Wellington, New Zealand. August 23, 2007.

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Presentation to NZARES Workshop
23 August 2007

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Context

- **MAFPolicy funded research as contribution to Primary Sector Partnership Group of SWPoA.**
  - **Range of possible management practice changes are possible to reduce diffuse discharges to water and increase efficiency of water use under irrigation.**
  - **Sub-optimal outcomes are likely if targets (or other policies) are developed without understanding the cost-effectiveness of these practices.**
  - **Method needed to calculate cost-effectiveness.**
  - **Developed a project to explore what is the least cost way to achieve a particular reduction in discharges.**

Method

- **Science based linked modeling.**
  - Identified 20+ management practices.
  - Seven case study farms. (MAF farm monitoring)
  - Incorporate best science knowledge (AgR, NIWA, C&F, AquaLinc).
  - Modeling tools. (OVERSEER, LUCI, Udder, FarmMax, Financial Models).
  - Results
    - Discharges (N, P , Faecal micro organisms, Water Use)
    - Farm Financial Performance
    - Abatement cost / unit reduction.
    - Practice cost / effectiveness.

Method – Management Practices

- Nitrification inhibitors
- Optimised farm nutrient use
- Wintering pads
- Standoff pads
- Low / No Nitrogen input farming
- Wetlands
- Stream stock exclusion
- Stream vegetated strips
- Stream stock crossings
- Farming system intensity changes
- Land application of effluent
- Deferred effluent irrigation
- Low rate effluent application
- Advanced pond effluent systems
- Improved arable rotation.
- Nitrogen budgeting.
- Irrigation system audit and redesign
- Irrigation scheduling – low tech
- Irrigation scheduling – hi tech

Method – Case Study Farms

Case Study Farms – based on Farm Monitoring Models

- Waikato Dairy
- Canterbury Dairy
- Waikato Intensive Sheep and Beef
- Central North Island Hill Country Sheep and Beef
- Southland / Otago Hill Country Sheep and Beef
- South Island Deer
- Canterbury Arable

Method – Case Study Farms

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Farm Business Impacts on:

- Productivity
- Level of inputs
- Operating costs
- Capital structure
- Debt servicing costs
- Profitability
- Resilience

Results – Reduction in whole farm N discharges.%

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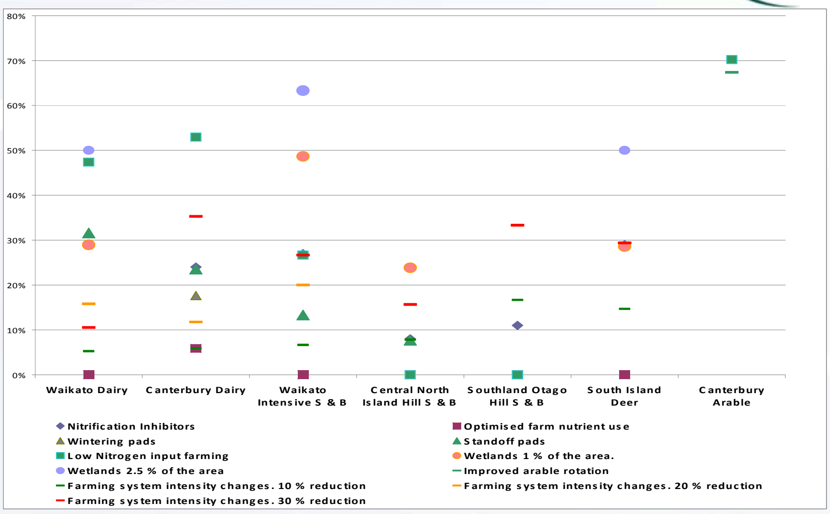
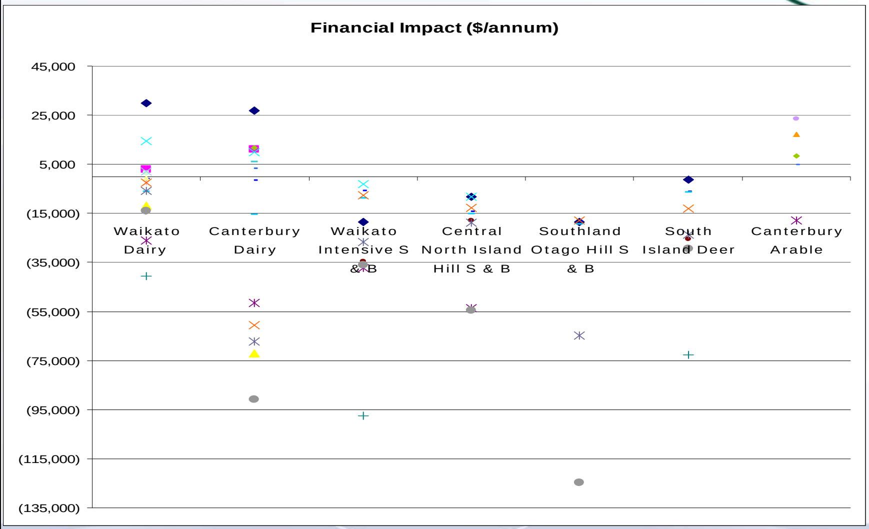
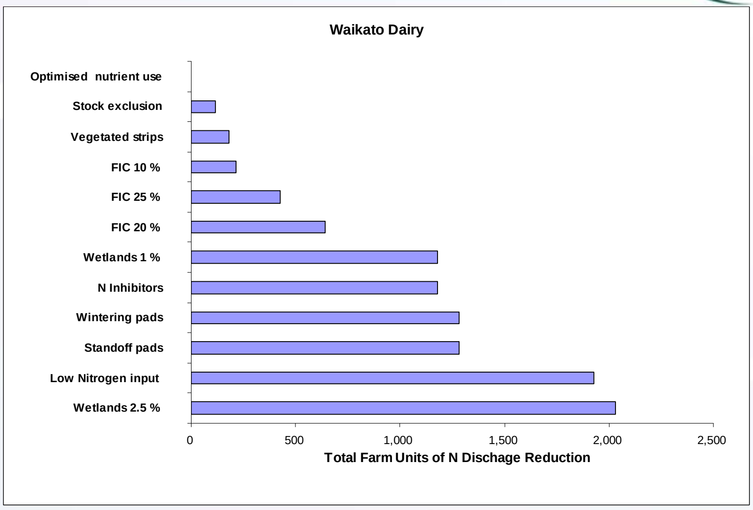


Results – Financial Impact



Results – Reduction in discharge units



Results – Abatement cost / unit reduction

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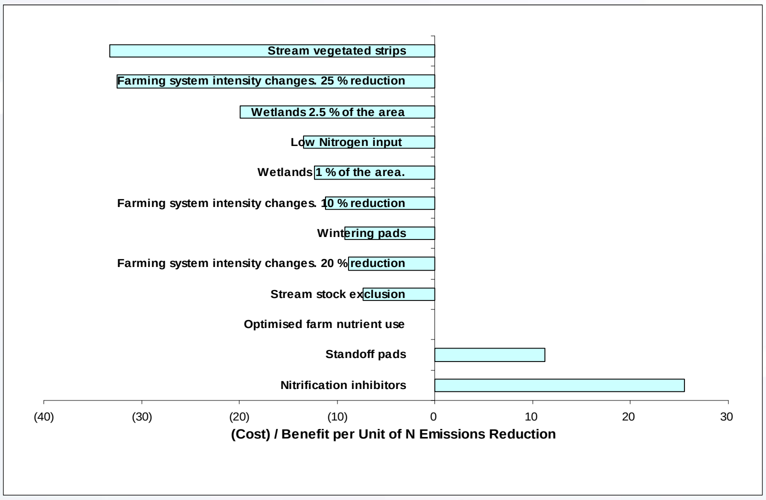

Results

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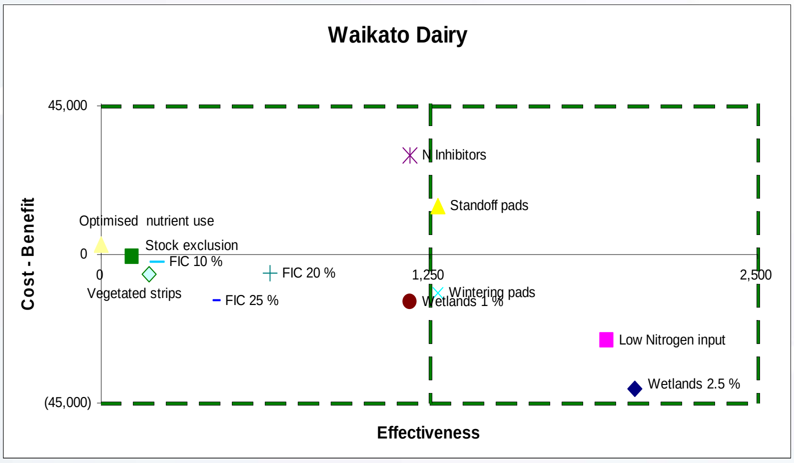

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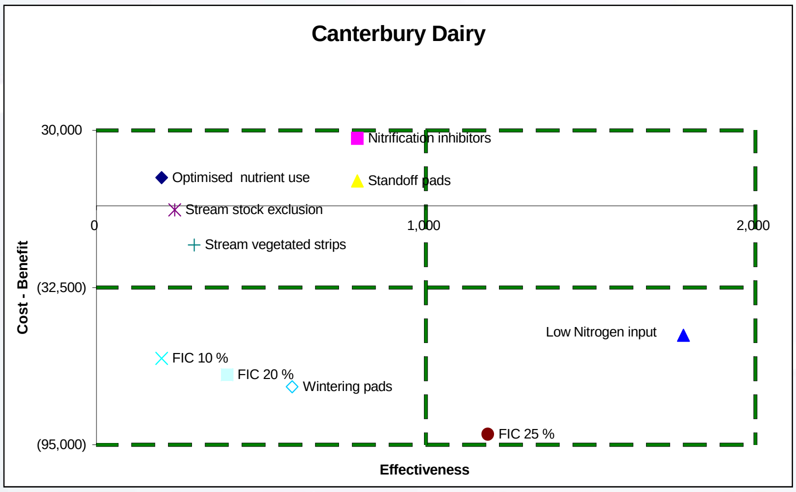

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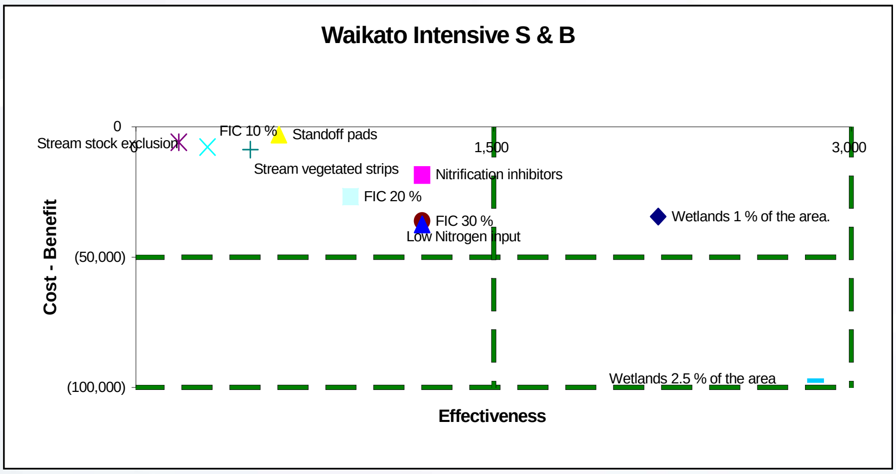

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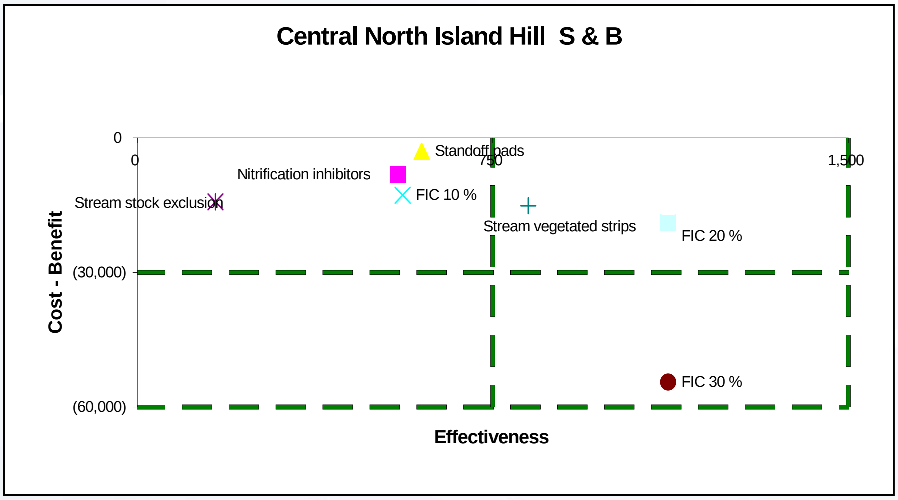

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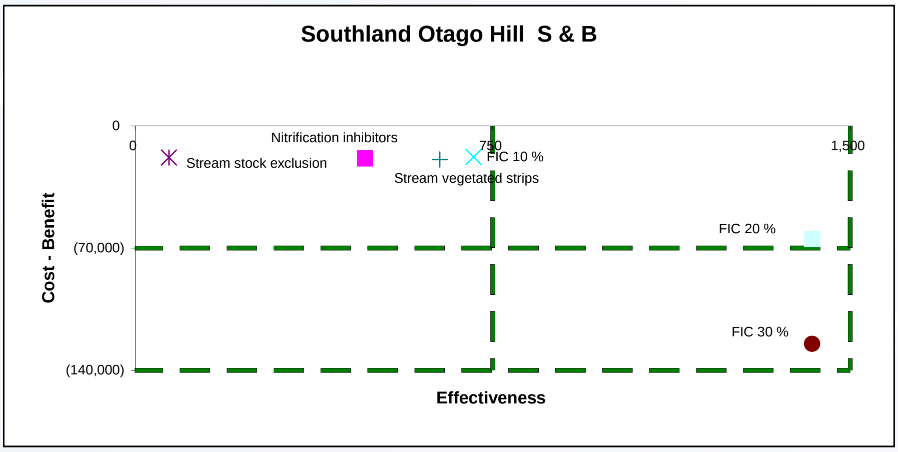

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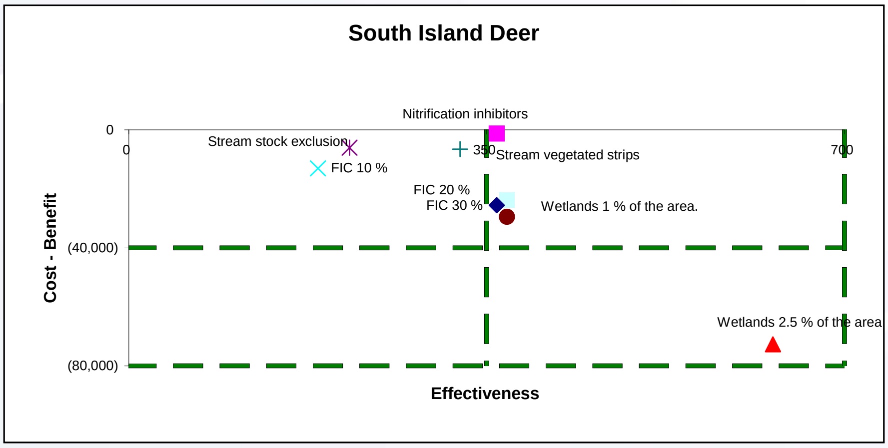

Conclusions

- All practices can reduce discharges to a varying degree.
- Not many are win: win environmentally and financially.
- Cost effective solutions vary depending on:
  - Farm type
  - Intensity
  - Characteristics – location, soils, slope etc.
  - Productivity and product prices.

Conclusions – Key Messages

- Method can be used to inform decision making at policy and farm level.
- No “one size fits all solution to discharges.”
- Need to research more cost effective and operationally efficient responses.
- Most effective options often require significant capital expenditure.
- Need to consider profitability / affordability as well as operational issues such as ease of implementation etc.
- Some practices have already been targeted by industries as preferred responses and are widely adopted.

Conclusions – Further Work

- Expand scope of case study farm types.
- Test sensitivity to science assumptions and profitability variability.
- Look at potential for combined use of practices.
- Other discharges, co benefits. (sediment, bugs).
- GHG emissions.