Stakeholder Meeting, Dublin, 10 June 2016

AGRI-I
Agricultural Greenhouse Gas Research Initiative - Ireland

Sustainable Nitrogen Fertiliser Use & Disaggregated Emissions of Nitrogen

Fertiliser N formulation – impact on yield

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Department of Agriculture, Food and the Marine
An Roinn Talmhaíochta, Bia agus Mara

teagasc
Agriculture and Food Development Authority

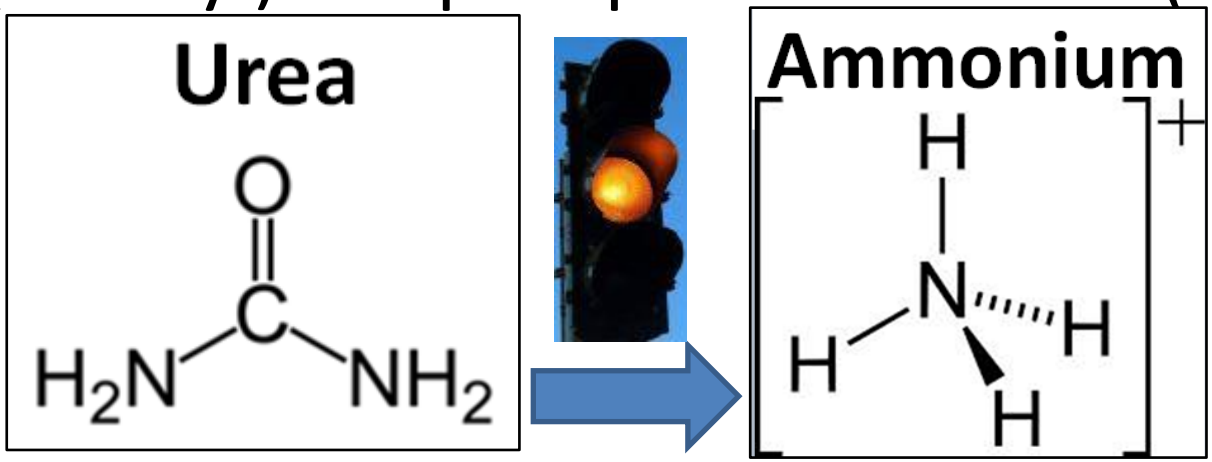
How does N formulation affect yield?

Grassland

Spring barley

Urease inhibition

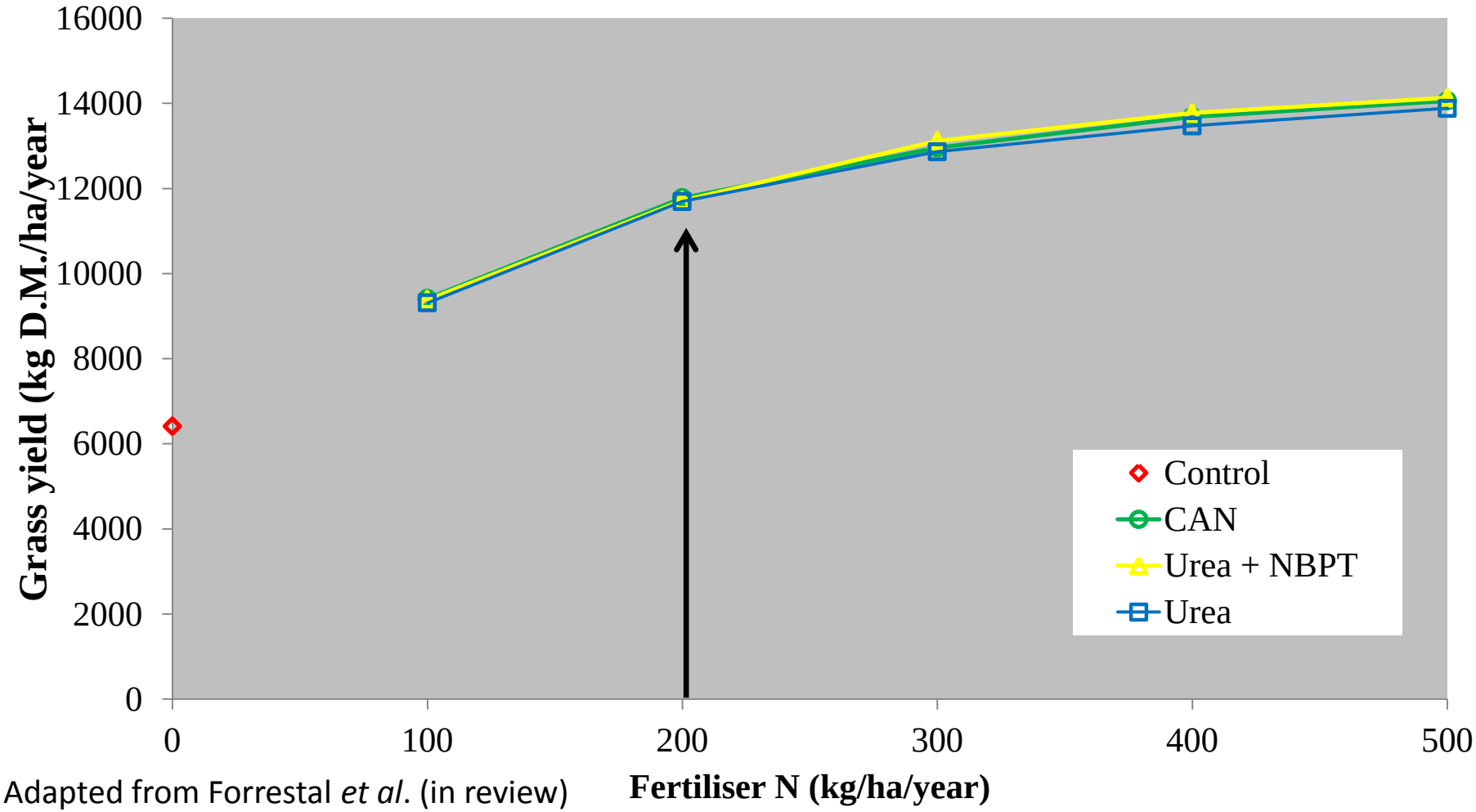
N-(n-butyl) thiophosphoric triamide (NBPT)



- Most widely used globally (Chien *et al.*, 2009)
- Active ingredient is off patent
- Koch hold patents on AGROTAIN® formulation
- Urea + AGROTAIN® is marketed in Ireland as Koch advanced Nitrogen (KaN) 660 ppm NBPT
- It is this formulation of NBPT which was tested in the current work

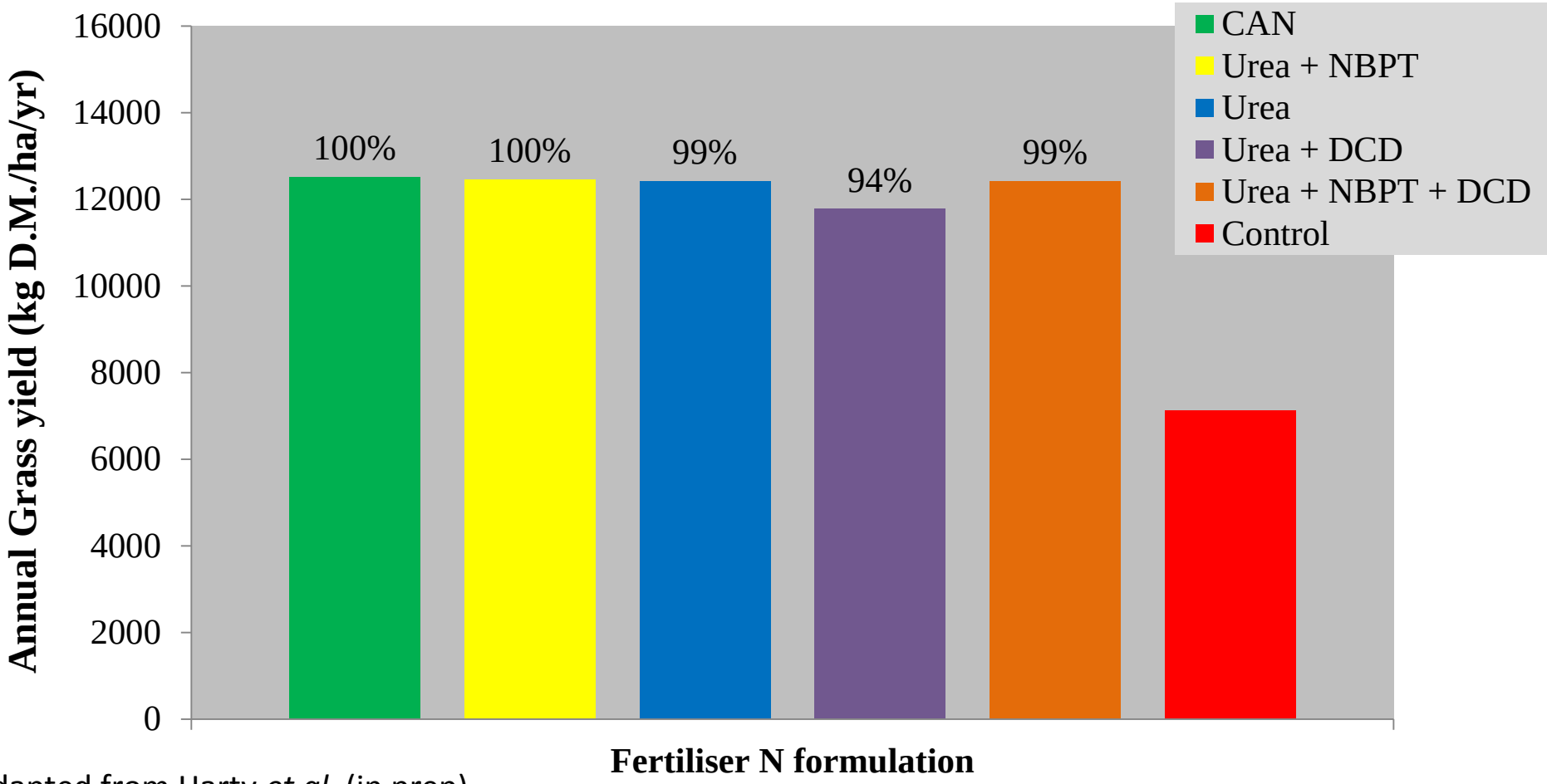
AFBI and Teagasc's use of a commercial product in this research does not imply any endorsement or warranty of any quality for any specific purpose, of such a product.

Grassland: similar yield across N rates



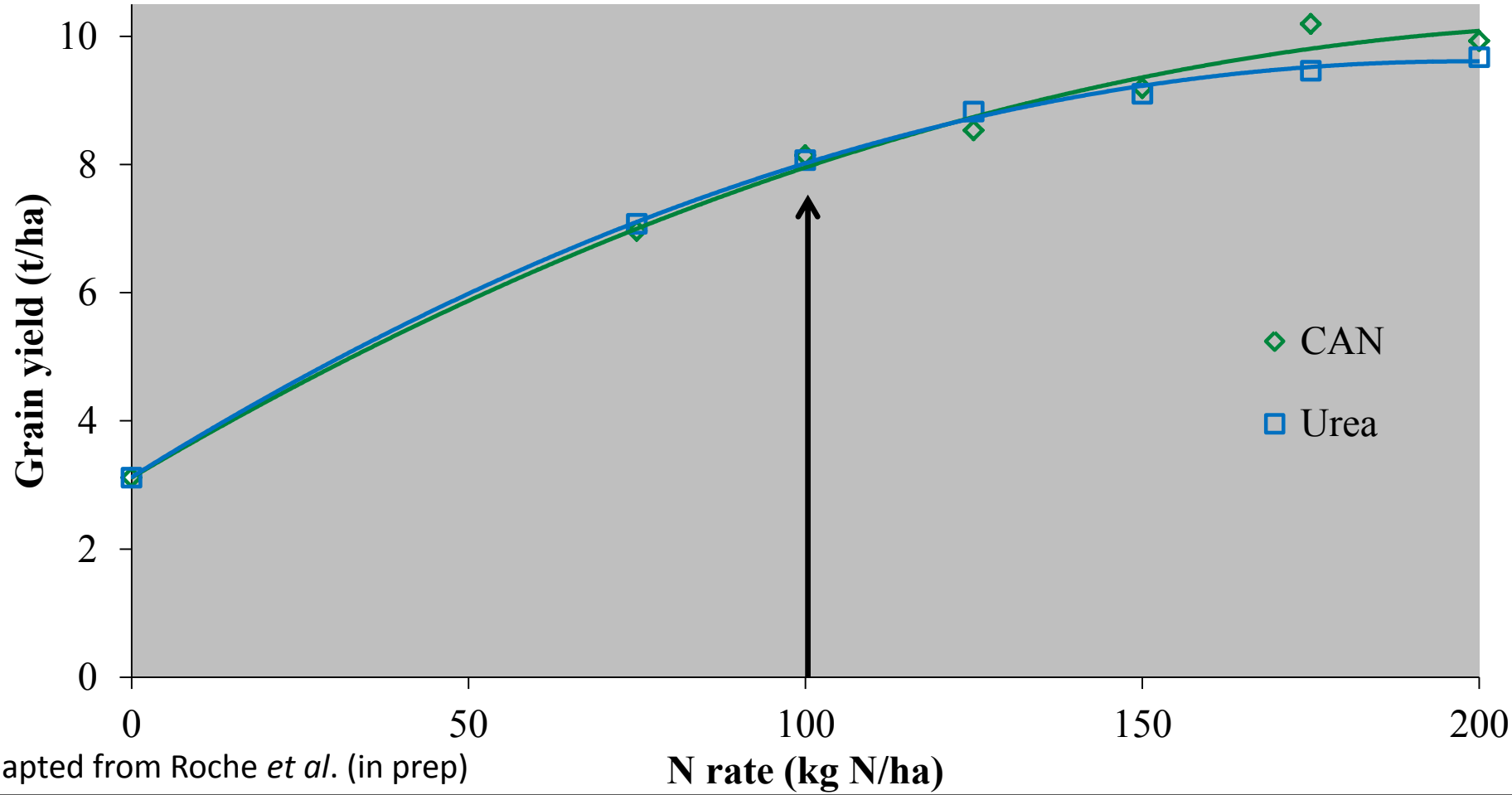
Adapted from Forrestal *et al*. (in review)

Grassland: Most fertiliser N options producing similar yield



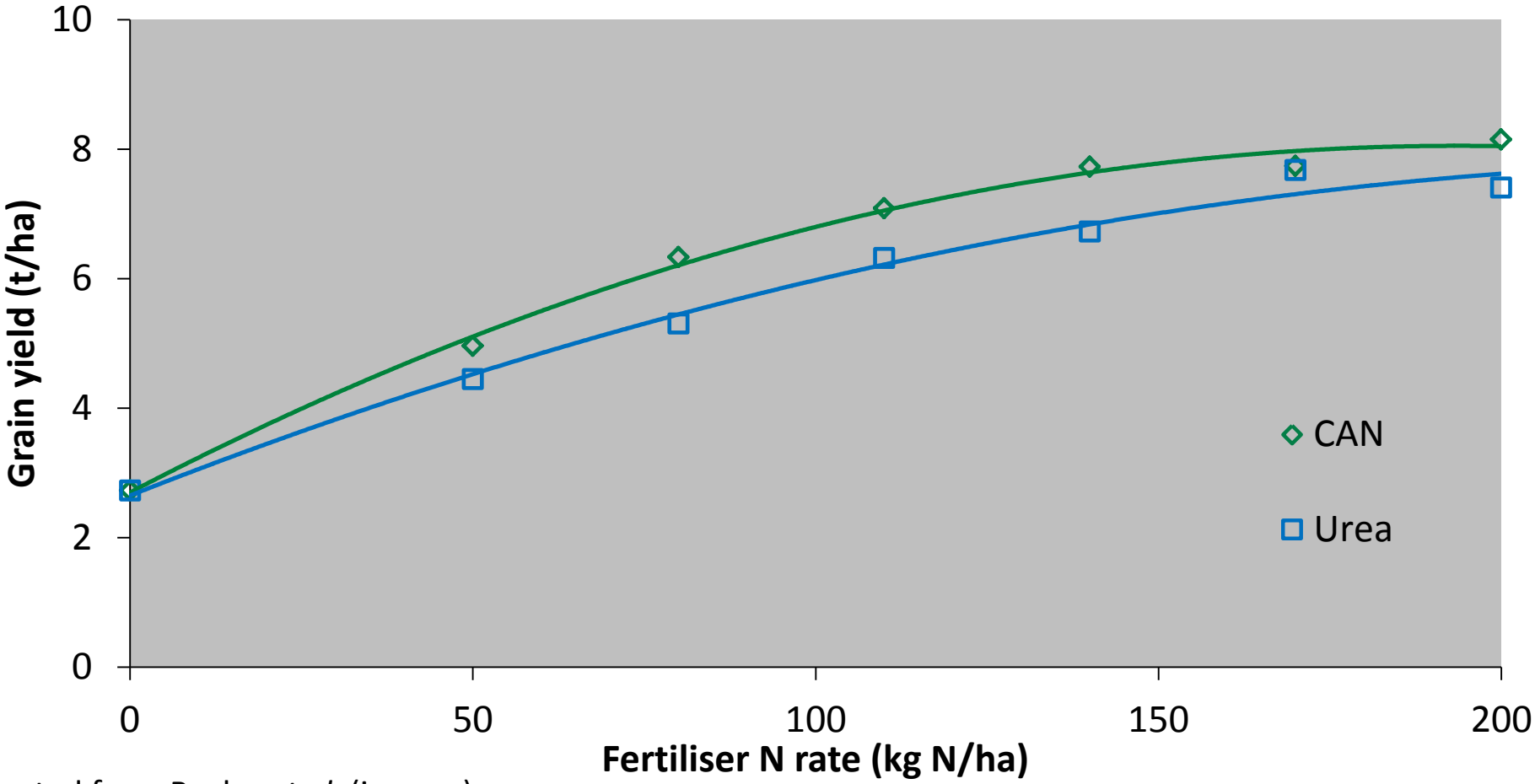
Adapted from Harty *et al*. (in prep)

Spring barley: Urea generally not significantly different to CAN (7 of 8 sites)



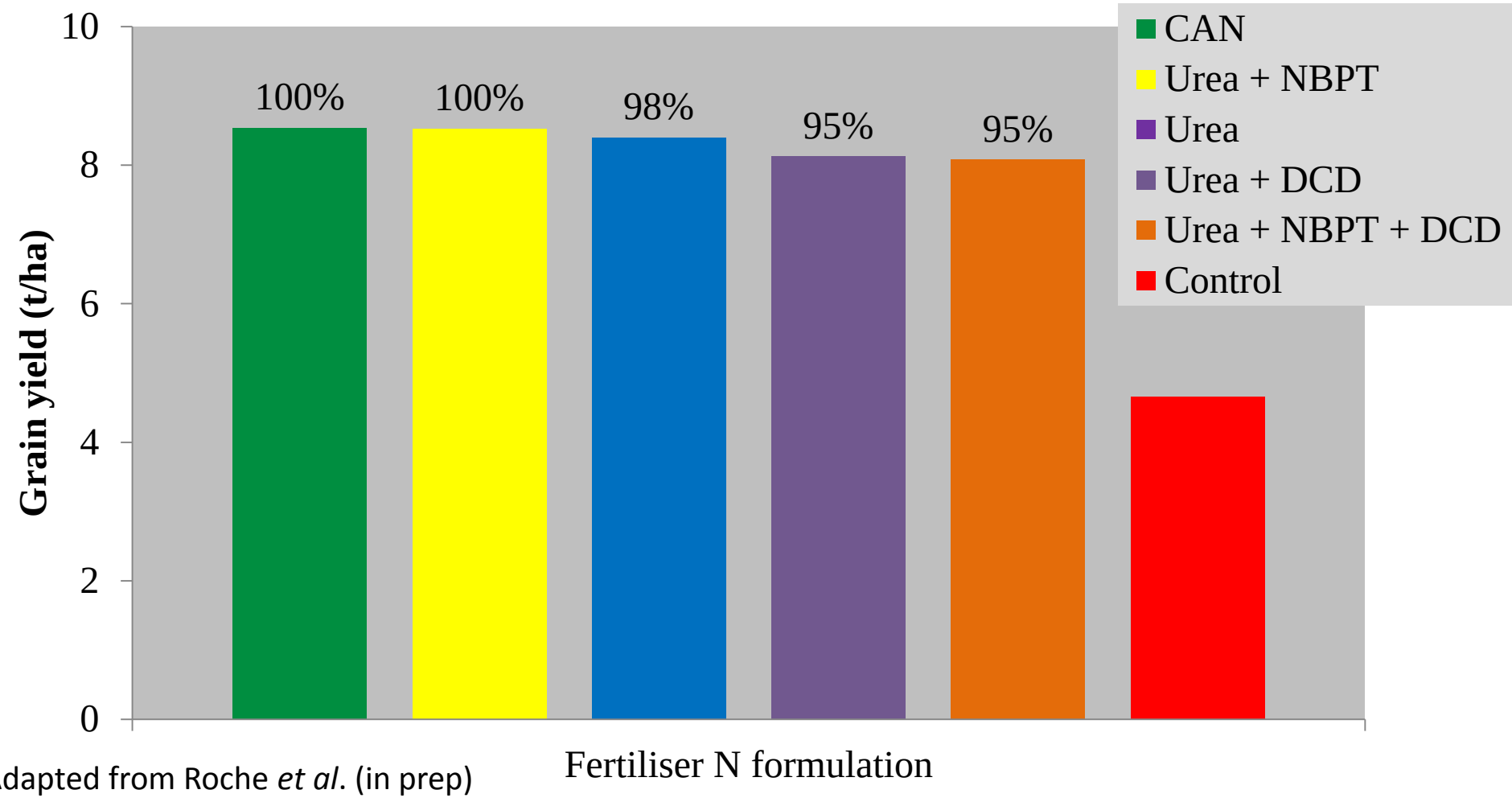
Adapted from Roche *et al*. (in prep)

Spring Barley: Occasionally urea underperforms relative to CAN (1 of 8 sites)



Adapted from Roche *et al*. (in prep)

Spring barley: urea+NBPT consistently yields as well as CAN



Adapted from Roche *et al*. (in prep)

How efficient are these N formulations?

How much of the applied N is recovered in the grass / grain + straw?

Fertiliser N Applied

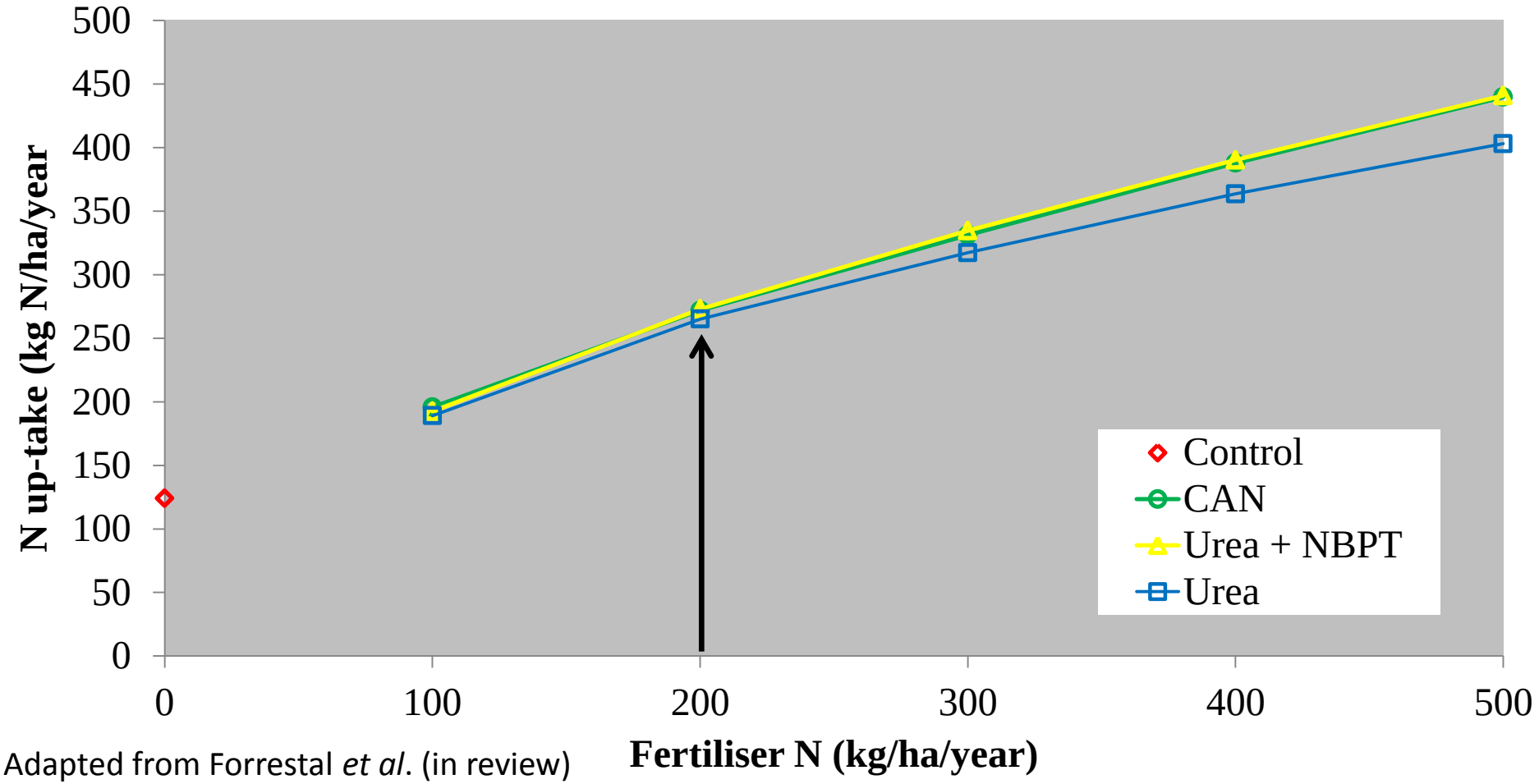
Fertiliser N recovered by crop

Forrestal, P.J. 2016

Apparent fertiliser N recovery (%) =

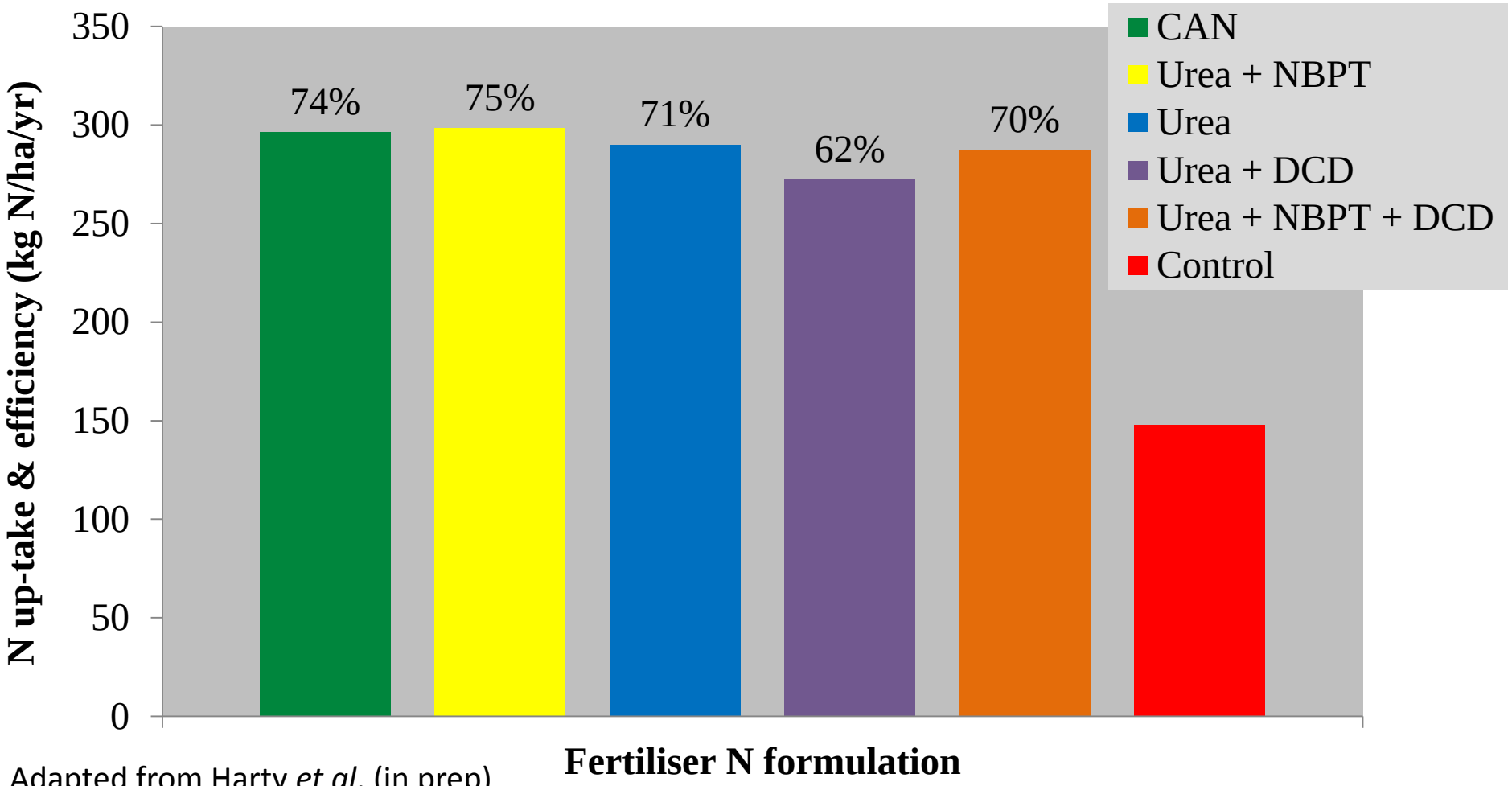
$$\frac{\text{Crop N}_{\text{fertiliser}} - \text{Crop N}_{\text{control}}}{\text{Total N Fertiliser applied}}$$

Grassland: Lower fertiliser N recovery with urea, gap increases with higher rates



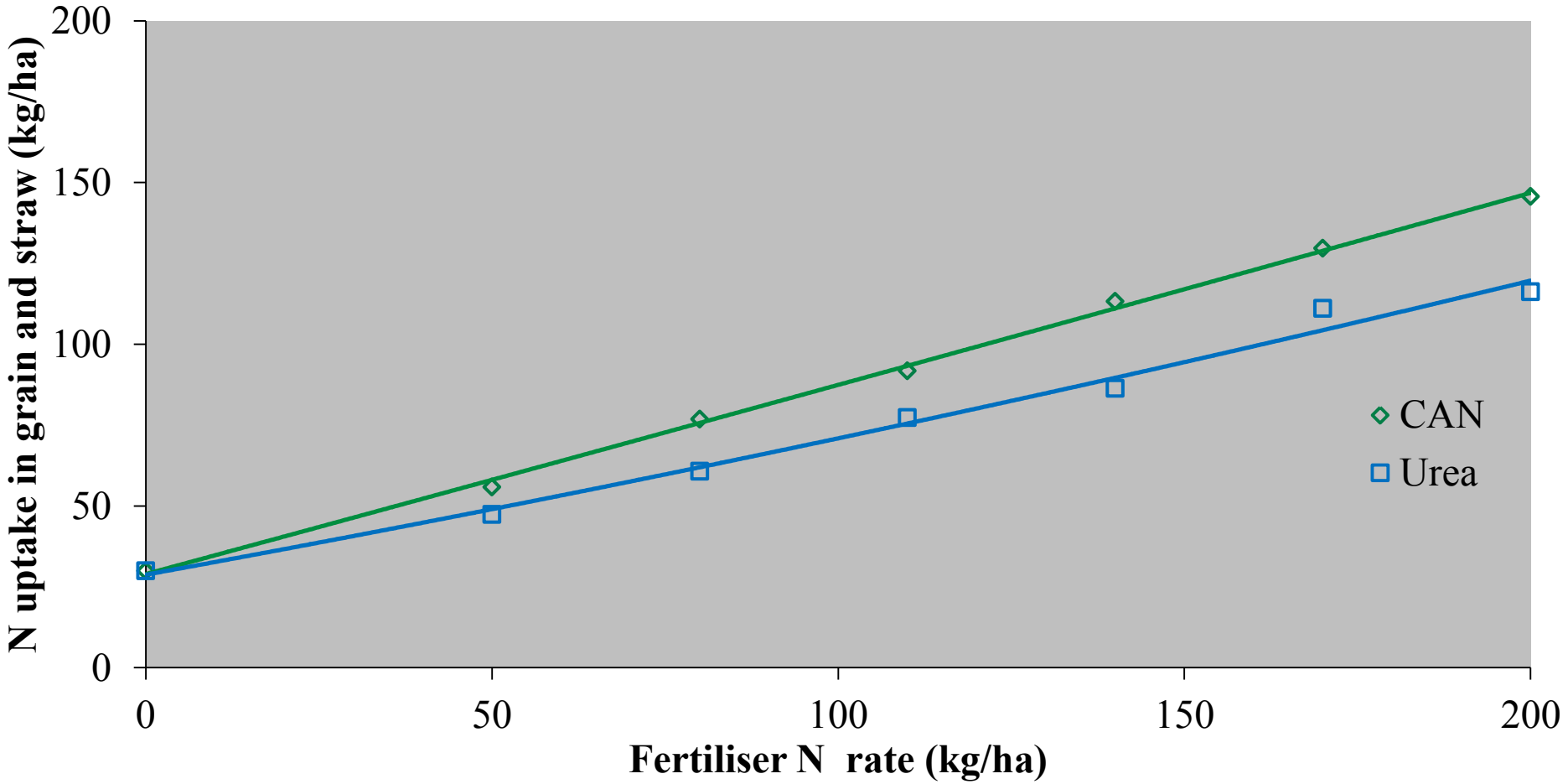
Adapted from Forrestal *et al*. (in review)

Grassland: Urea+NBPT is as efficient as CAN



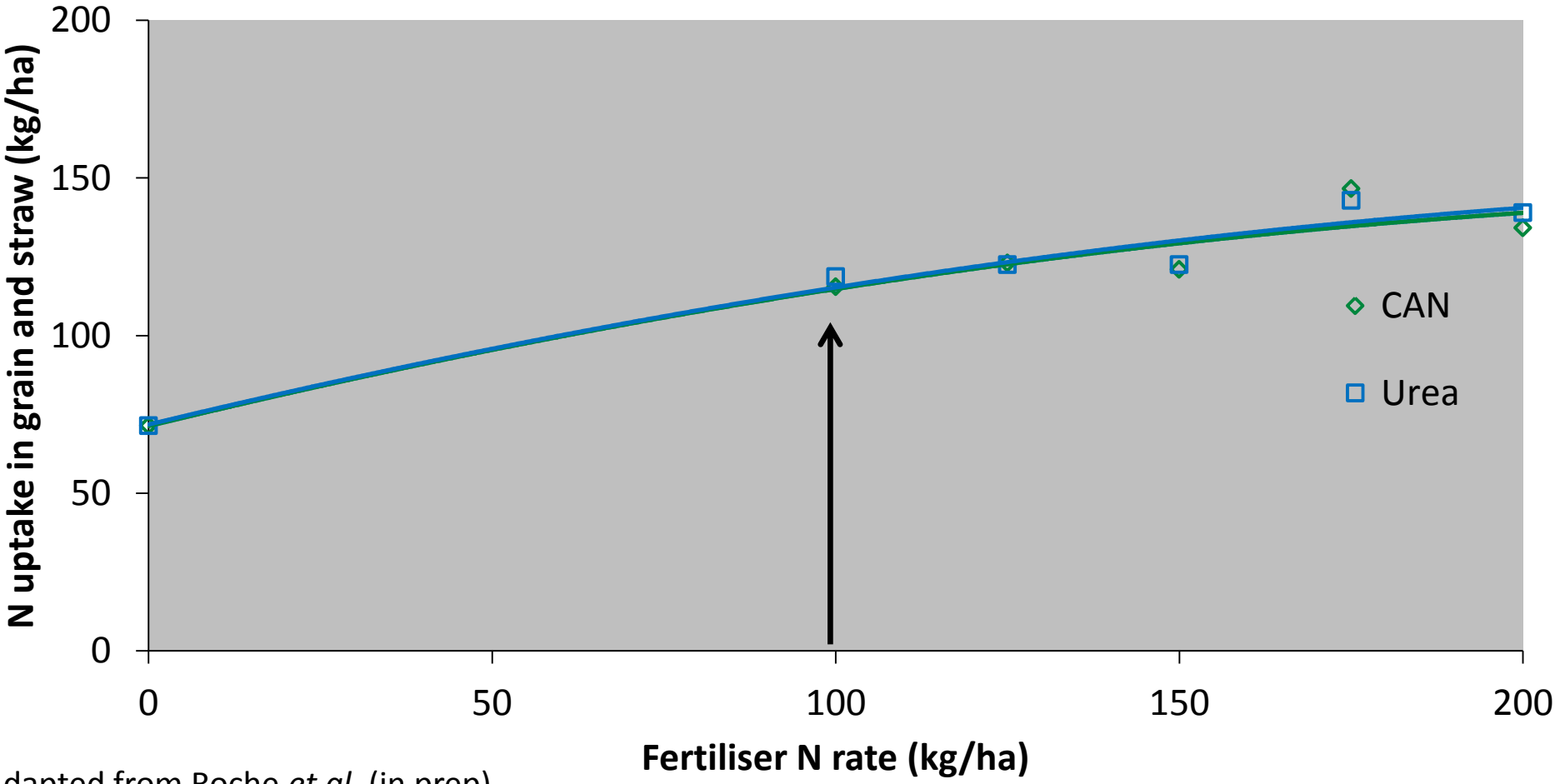
Adapted from Harty *et al*. (in prep)

Spring barley: Urea frequently had lower N recovery than CAN (6 of 8 sites)



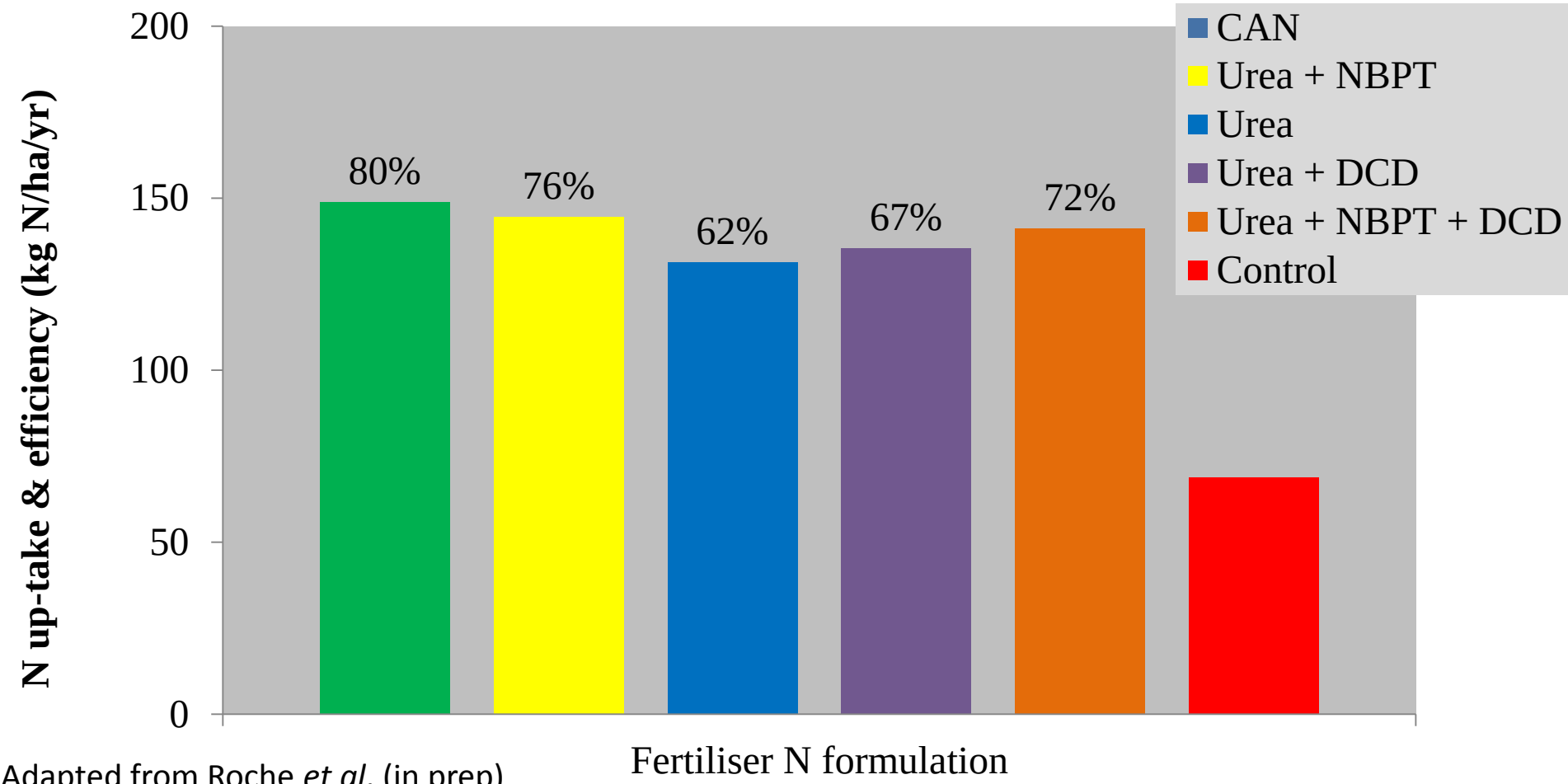
Adapted from Roche *et al*. (in prep)

Spring barley: Urea occasionally had equal N recovery to CAN (2 of 8 sites)



Adapted from Roche *et al*. (in prep)

Spring barley: NBPT brought urea efficiency up to similar level as CAN



Adapted from Roche *et al*. (in prep)

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Key messages

Sustainable Nitrogen Fertiliser Use & Disaggregated Emissions of Nitrogen

Yield

- CAN and urea frequently achieve the same yield
- Urea + NBPT consistently achieved the same yield as CAN
- Urea + DCD often had lower yield unless treated with NBPT

Efficiency

- Urea frequently has lower fertiliser recovery than CAN
- NBPT treated urea is as efficient as CAN

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Thank you for your attention

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&

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