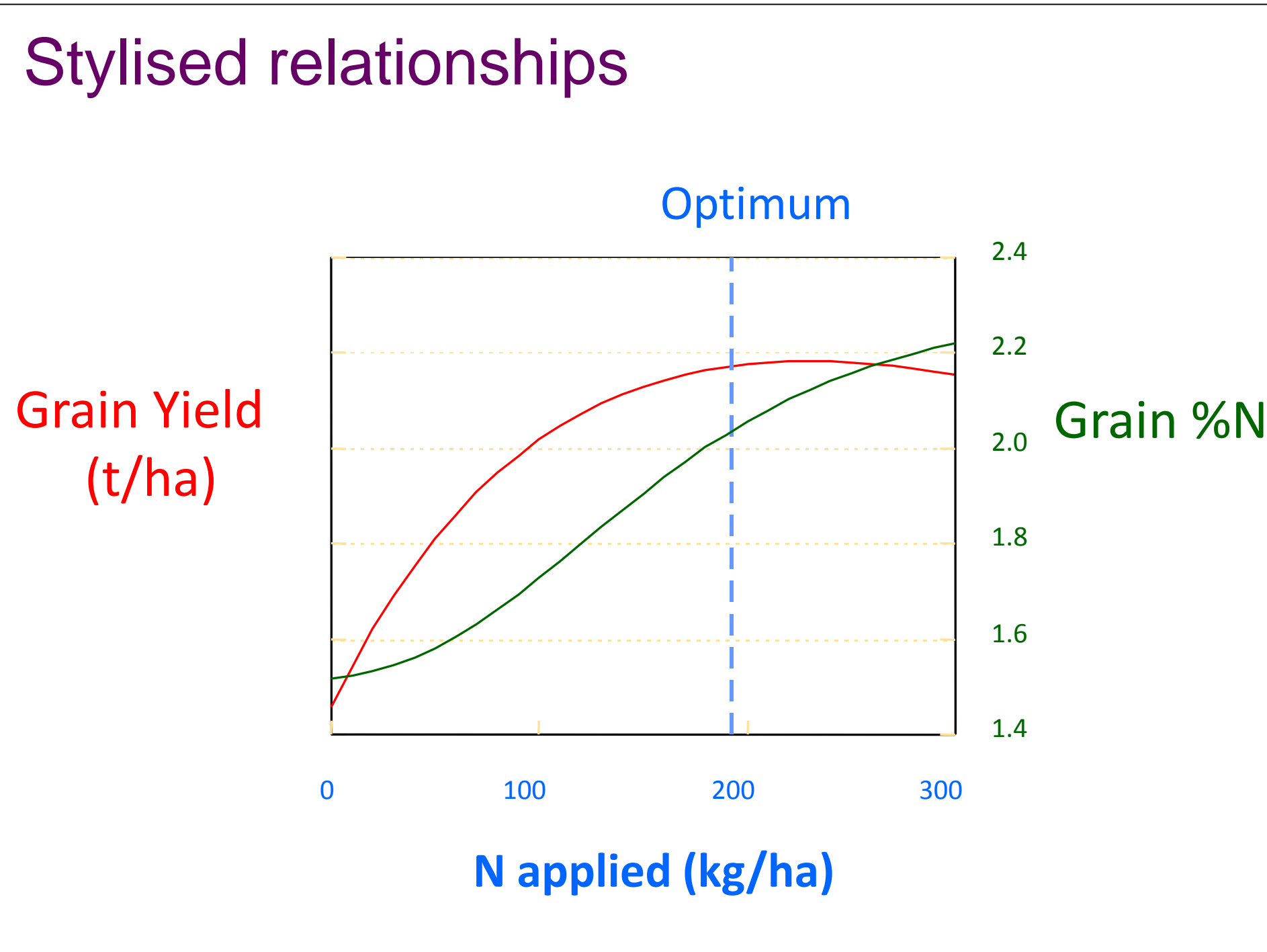


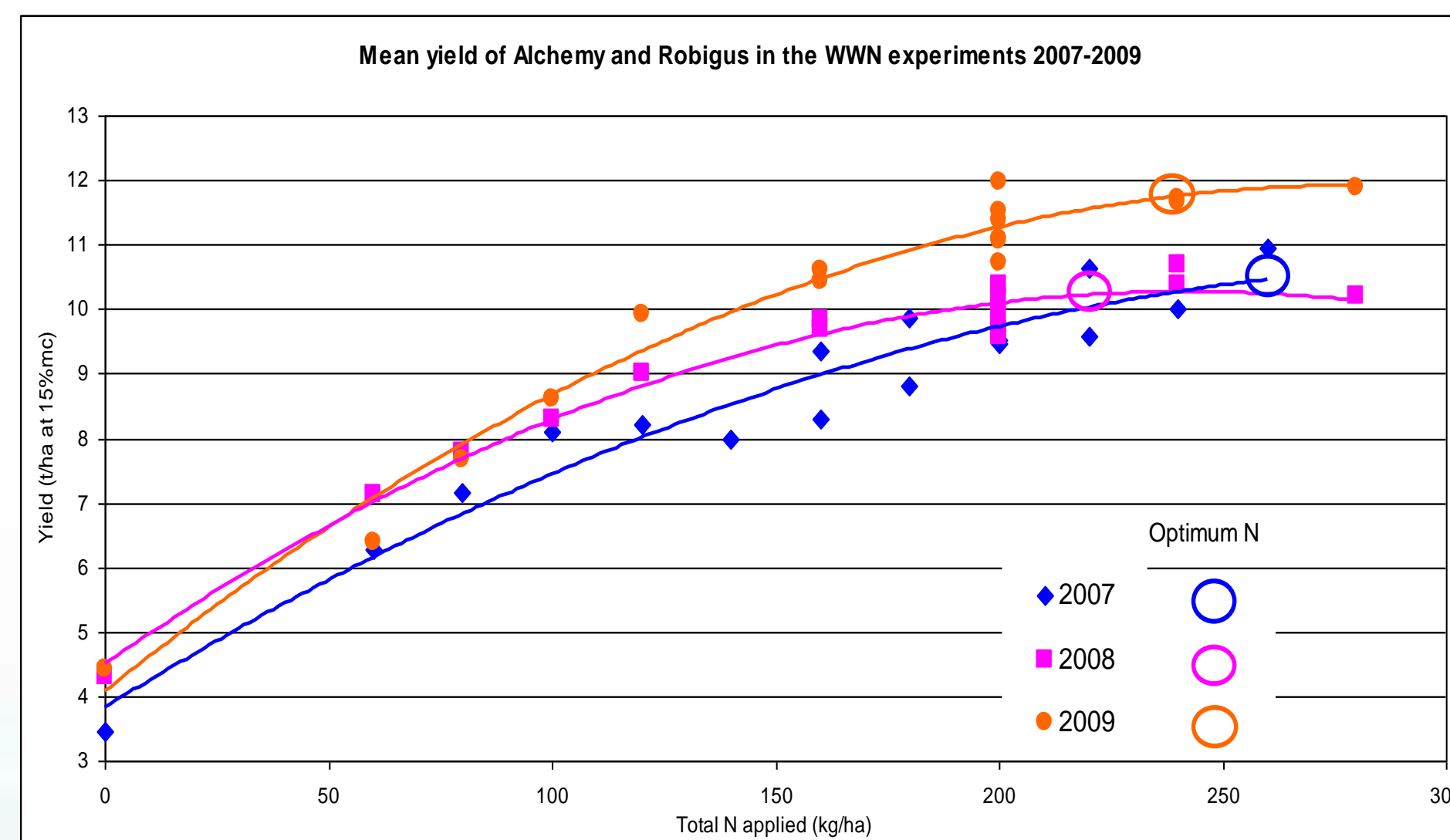
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## Relationships of grain yield and grain %N with applied fertiliser N in winter wheat



### Grain yield



### Grain %N



### Winter wheat experiments at AFBI Crossnacreevy 2007-09

As N available to the crop increases:

- At low availability, yield is low and grain %N is low
- When more N is available, yield increases but grain %N increases more slowly, i.e. the crop uses the N to produce yield rather than increase protein content in the grain
- When the crop can produce all the yield possible as determined by **other** factors, yield stops increasing but grain %N continues to increase
- When too much N is available, the crop lodges, having taken it up and used it in growth, and grain %N continues to increase

The Fertiliser Manual (RB 209) states that:

Grain %N at the economic optimum rate of nitrogen is about 1.9% N (100% dry matter basis) for feed wheat and 2.1% N for bread-making wheat. Where concentrations in yields from a number of adjacent fields are consistently above or below these values during several years, nitrogen fertiliser application rates should be adjusted down or up by 30 kg N/ha per 0.1% difference in grain %N.

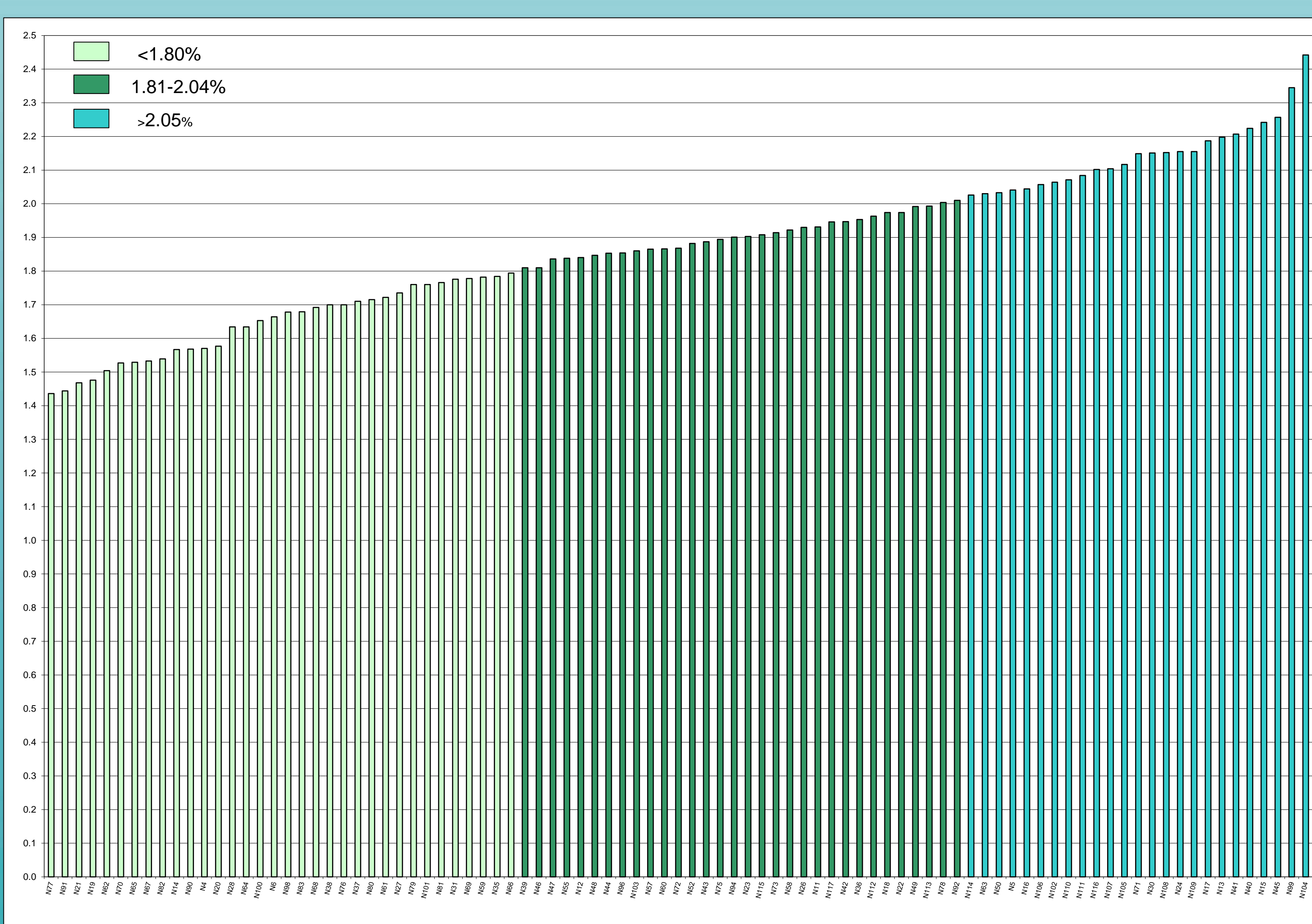
The HGCA Nitrogen for winter wheat – management guidelines (2009) state that:

'Grain protein (nitrogen) with optimum N for yield in feed varieties is consistently about 11% (1.9%N)'

## The CAFRE grain %N project

CAFRE Crop Development advisers have been collecting grain samples from growers' crops on which grain %N has been determined by AFBI.

### Grain %N in winter wheat crops in N Ireland 2008-2012



Using grain %N to check efficiency of uptake of N by the crop

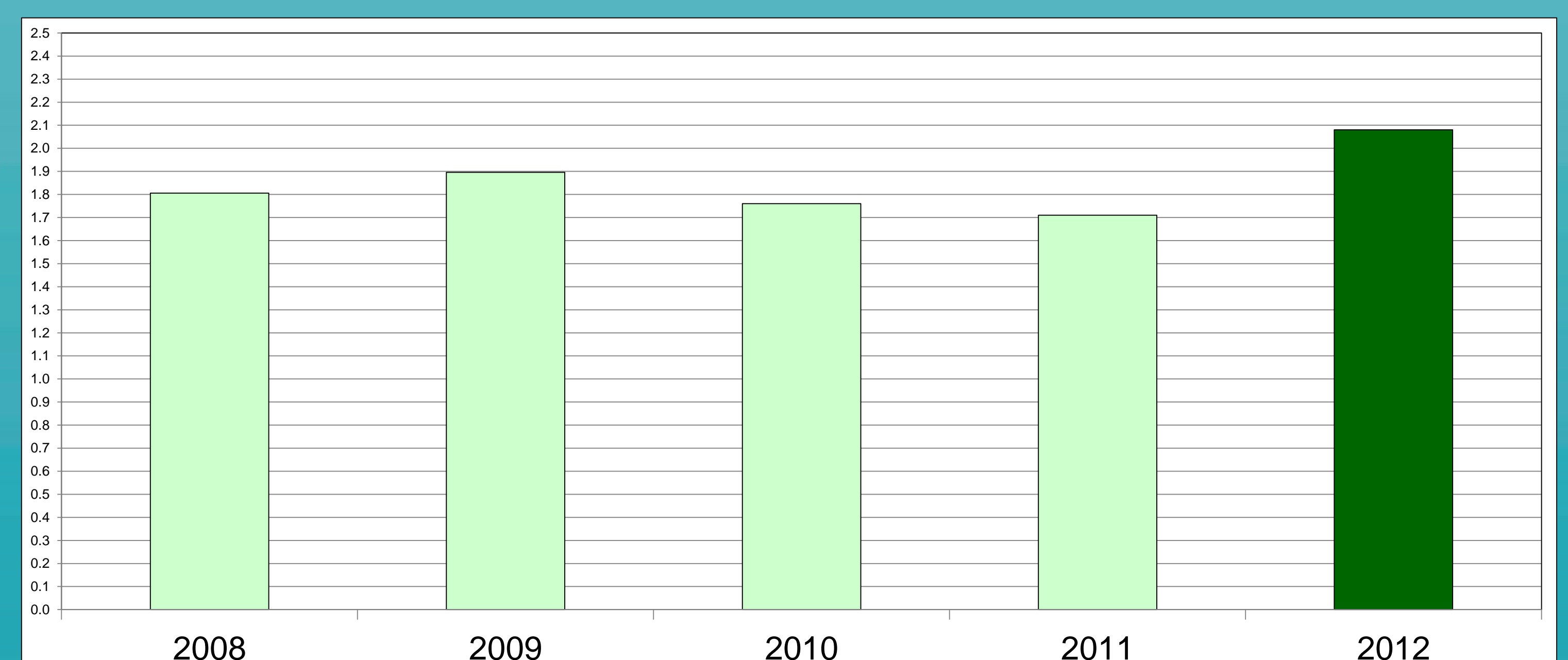
In crops that have been stress-free:

Where grain %N <1.8%, the crop used N very efficiently, and if more N had been taken up, then yield may have been higher

Where grain %N >2.0%, the crop used N inefficiently and too much N was available, less fertiliser N (organic manure N) could have been applied

(Lodging, drought, disease, etc. may also affect yield and grain %N – leading to lower yields and higher grain %Ns)

### Grain %N in winter wheat crops in N Ireland annual averages



## Conclusions

- Grain %N is a good indicator of efficiency of N use by crops BUT it is retrospective
- Grain %N, however, can be a useful tool in reviewing N use along with yield and other information about crop management and weather