

Can extra energy or
adaptation to nitrate
reduce nitrite
accumulation
in rumen contents *in
vitro*?

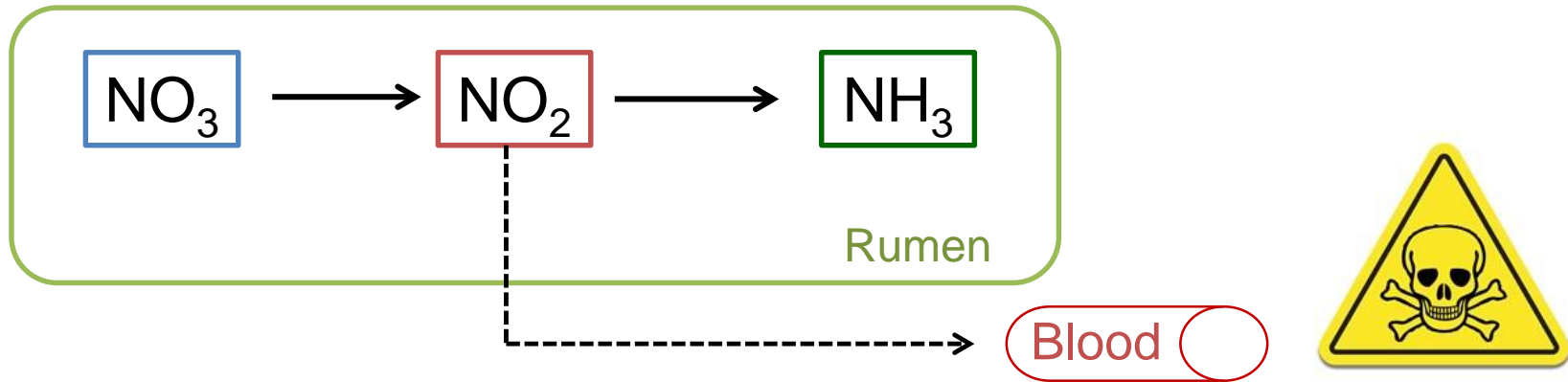


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GGAA 2016, Melbourne, Australia

- Nitrate (NO_3) supplementation in ruminants:



- Uncertainties regarding nitrite (NO_2) toxicity:
 - Role of fermentable energy?
 - Adaptation to dietary NO_3 beneficial?
- *In vitro* study with 2 experiments studying:
 - **Issue 1:** Effect of fermentable energy supplied by glucose (Glu) or glycerol (Gly), differing in NADH yields
 - **Issue 2:** Effect of adaptation of the rumen to NO_3

Treatments

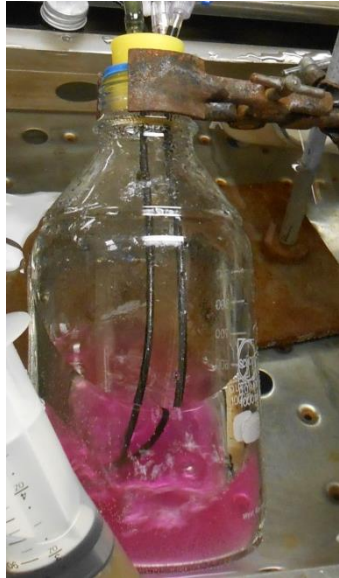
- Issue 1: Energy supply

Added N	NO ₃			Urea		
Added energy	Control	Glucose	Glycerol	Control	Glucose	Glycerol
Rumen donor adapted to :	NO ₃			Urea		

- Issue 2 : Adaptation to NO₃

Added N	NO ₃	NO ₃	Urea
Rumen donor adapted to :	NO ₃	Urea	Urea

Common *in vitro* procedure

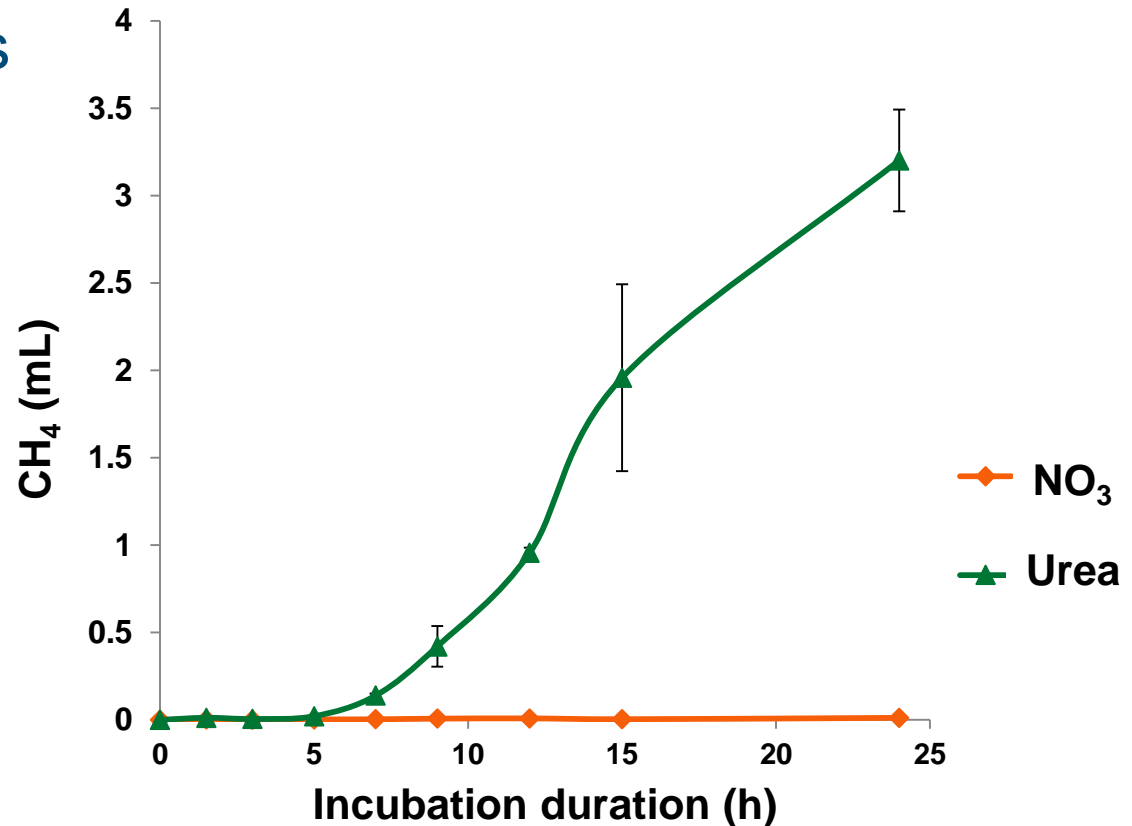


- (Soliva and Hess 2007)
- 9 time points (0-24 h incubations)
- Treatments incubated in triplicates

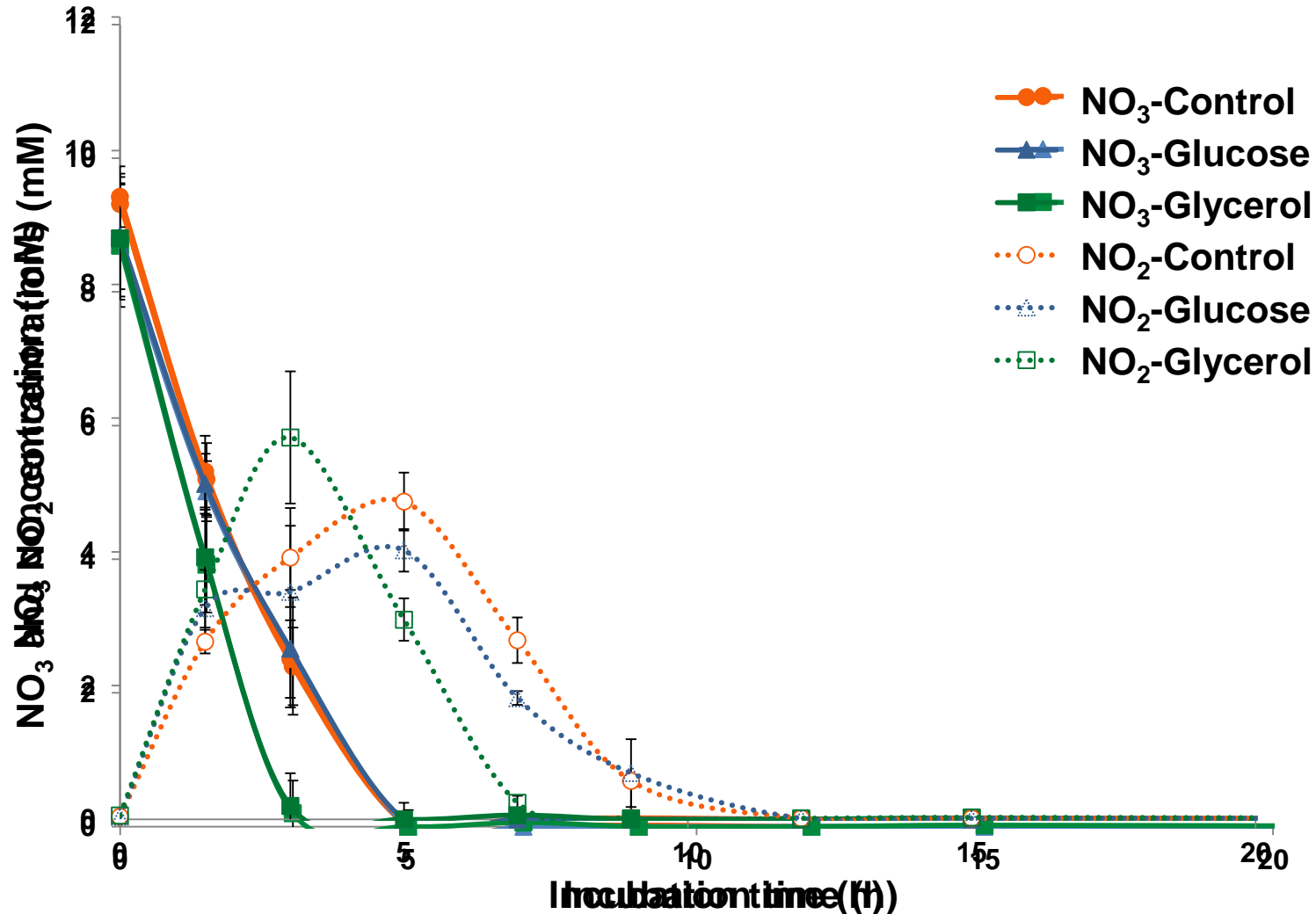


General effects of nitrate supplementation

- Lower CH₄ production
- Lower overall H₂ accumulation in NO₃ vs Urea treatments
- Slight inhibition of fermentation by NO₃
- Changed VFA ratios



Issue 1: Energy effects and NO_3^- metabolism

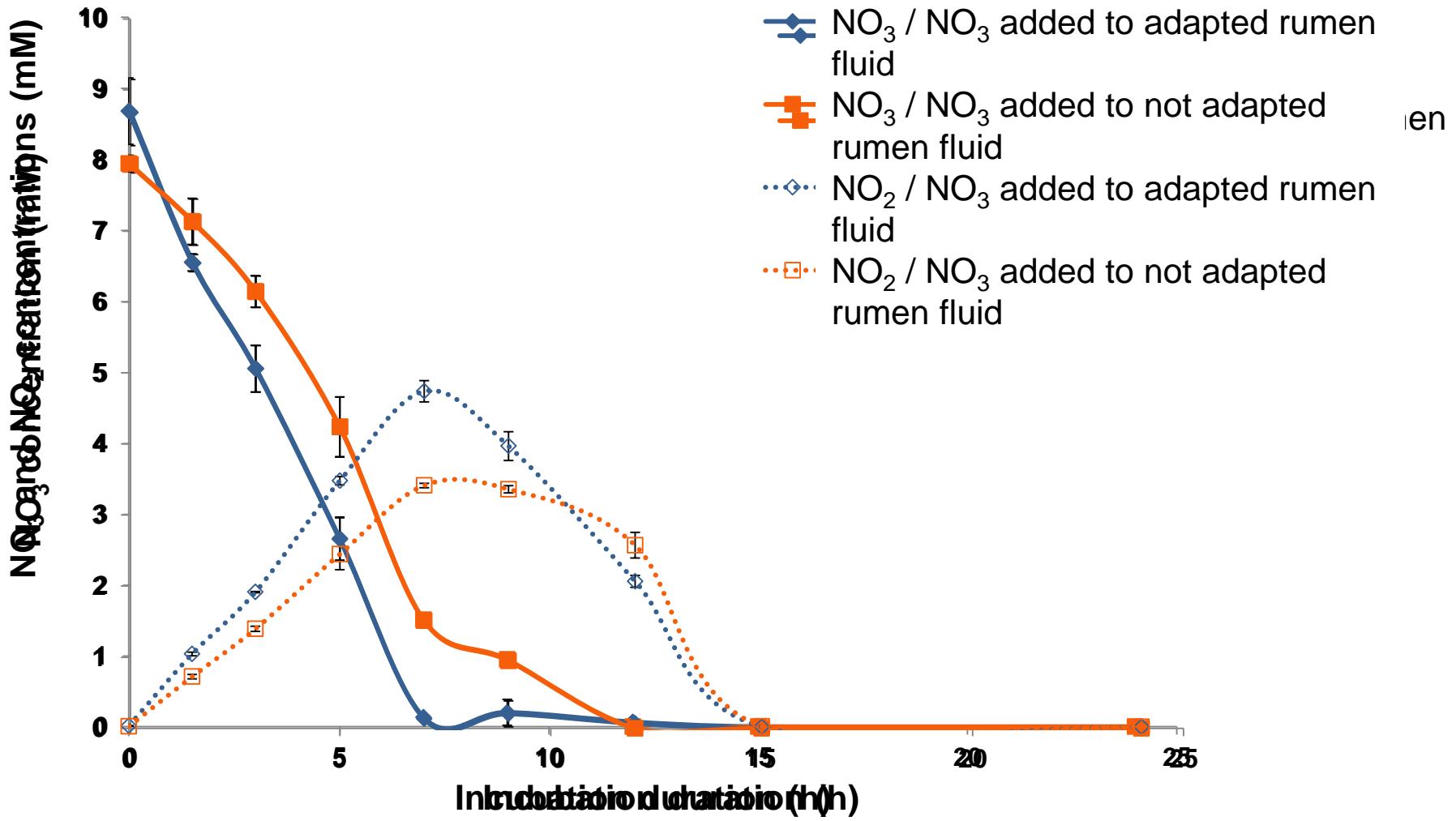


Issue 1: Take home messages

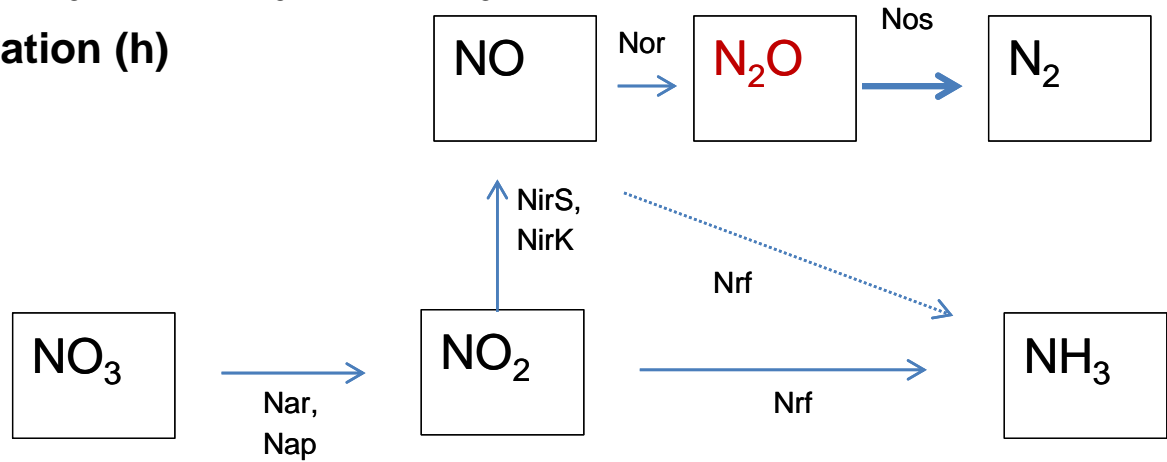
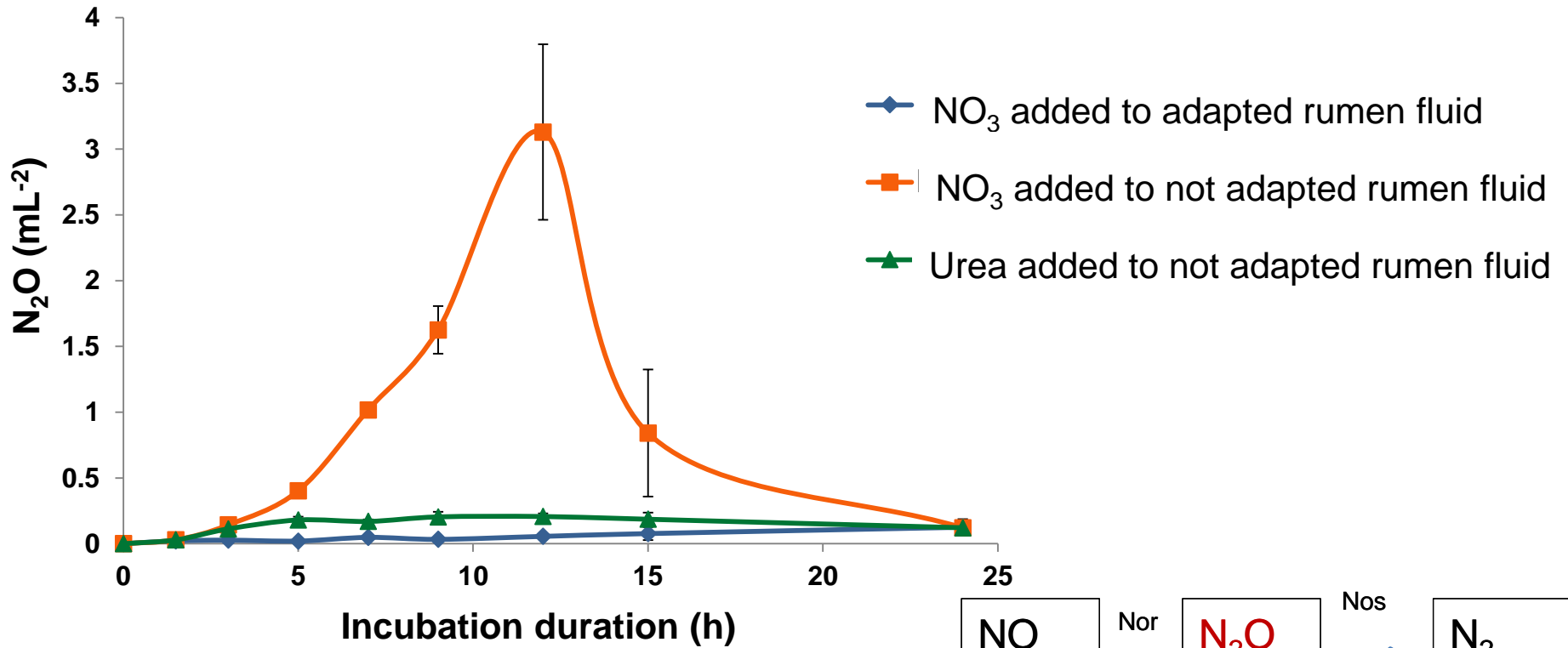
- Glycerol: Quicker disappearance of NO_3
 - ⇒ Stimulation of NO_3 reductase?
- Glucose: no major effect on NO_3 metabolism

- Increase in fermentation both by Glucose and Glycerol

Issue 2: Adaptation and NO_3 metabolism



New findings...



- Fermentable energy
 - No benefit in reducing NO_2 accumulation
 - Does NADH stimulate NO_3 rather than NO_2 reducing enzymes?

- Adaptation to dietary NO_3
 - Increases accumulated NO_2
 - *In vivo* consequences?

