Protein metabolism and nitrogen excretion in dairy cattle

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www.rednex-fp7.eu

EAAP Symposium Introduction

SEVENTH FRAMEWORK PROGRAMME

Innovative and practical management approaches to reduce nitrogen excretion by ruminants

60th Annual Meeting EAAP, Barcelona, Spain, 24-27 August 2009

Managing the European Nitrogen Problem

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UNECE/CLRLTAP Task Force on Reactive Nitrogen, 2009

- Reactive Nitrogen (**Nr**)
  - biological, photochemical, radiative active N compounds
  - reduced N (NH_3), oxidized N (N_2O), organic (protein)
  - production doubled in last 100 yr
  - crucial for global food security
  - main product: fertilizer
  - use efficiency is low:
    - Plant production: 14%
    - Animal production: 4%

UNECE = United Nations Economic Commission for Europe
CLRTAP = Convention on Long-range Transboundary Air Pollution

Agriculture contributes 10% of emission of acidifying substances (SO2, NOx, NH3) in EU27

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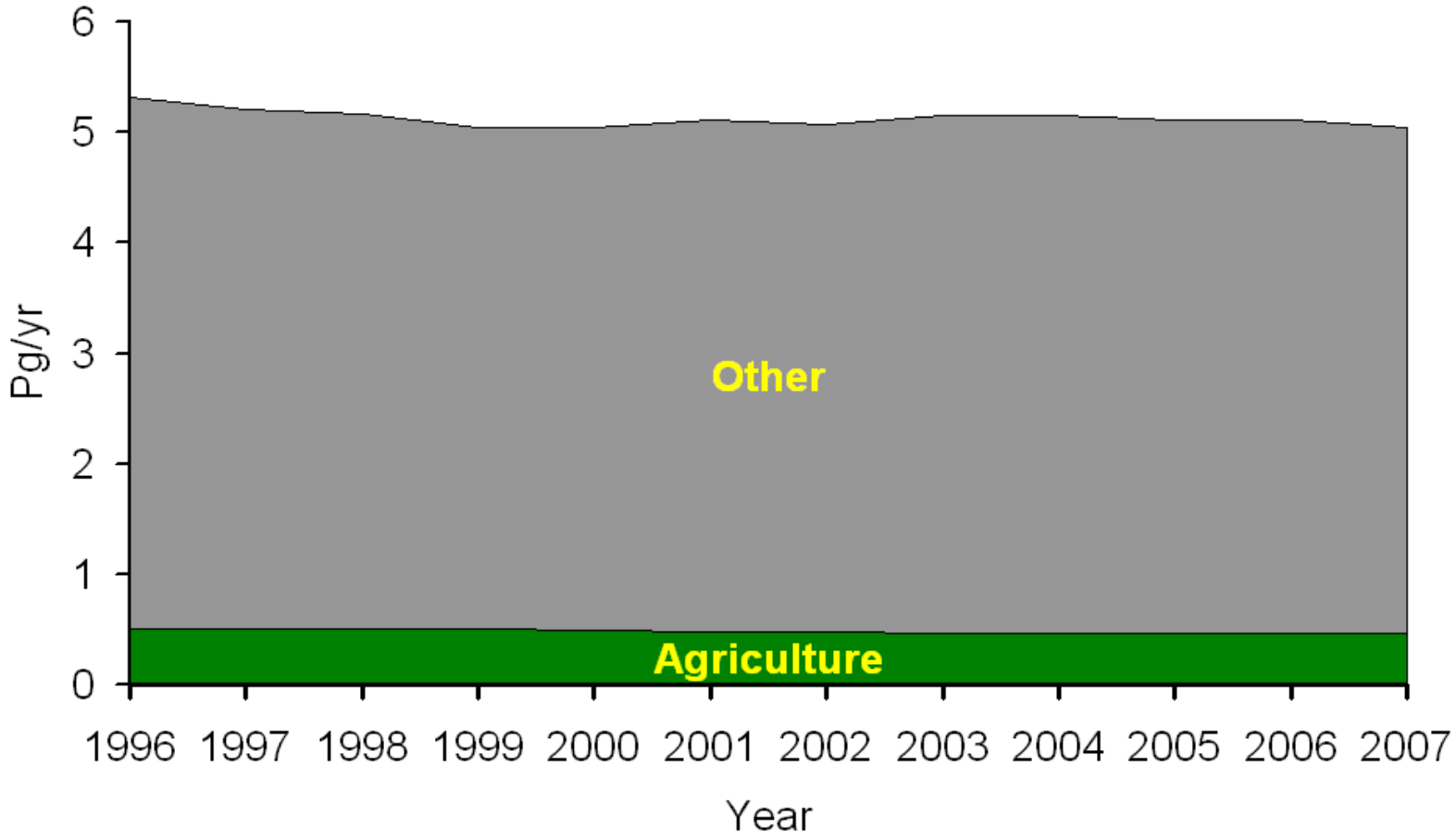
Eurostat, 2009



Peta g = 10^{12} kg

Nitrogen Challenge

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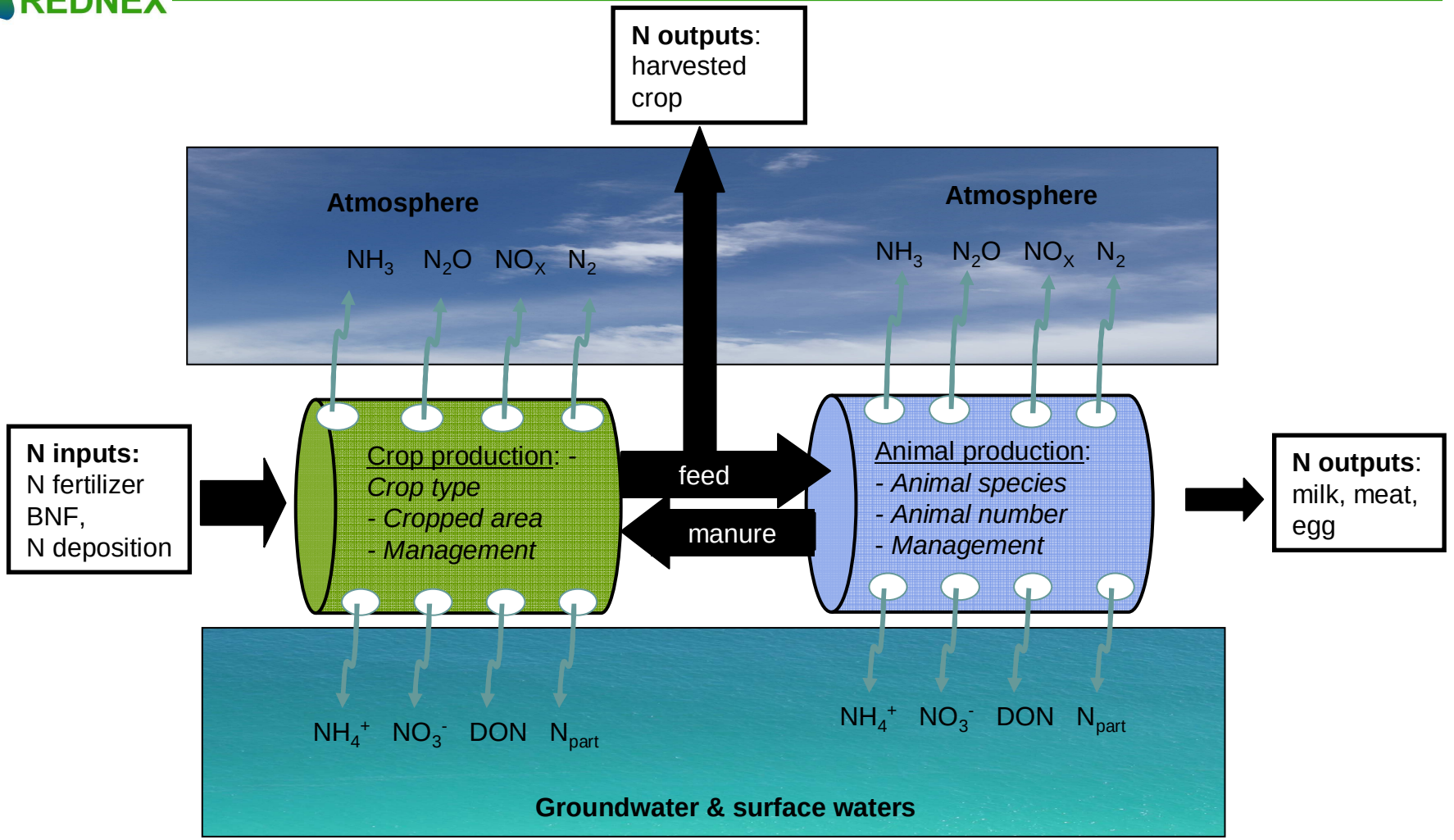
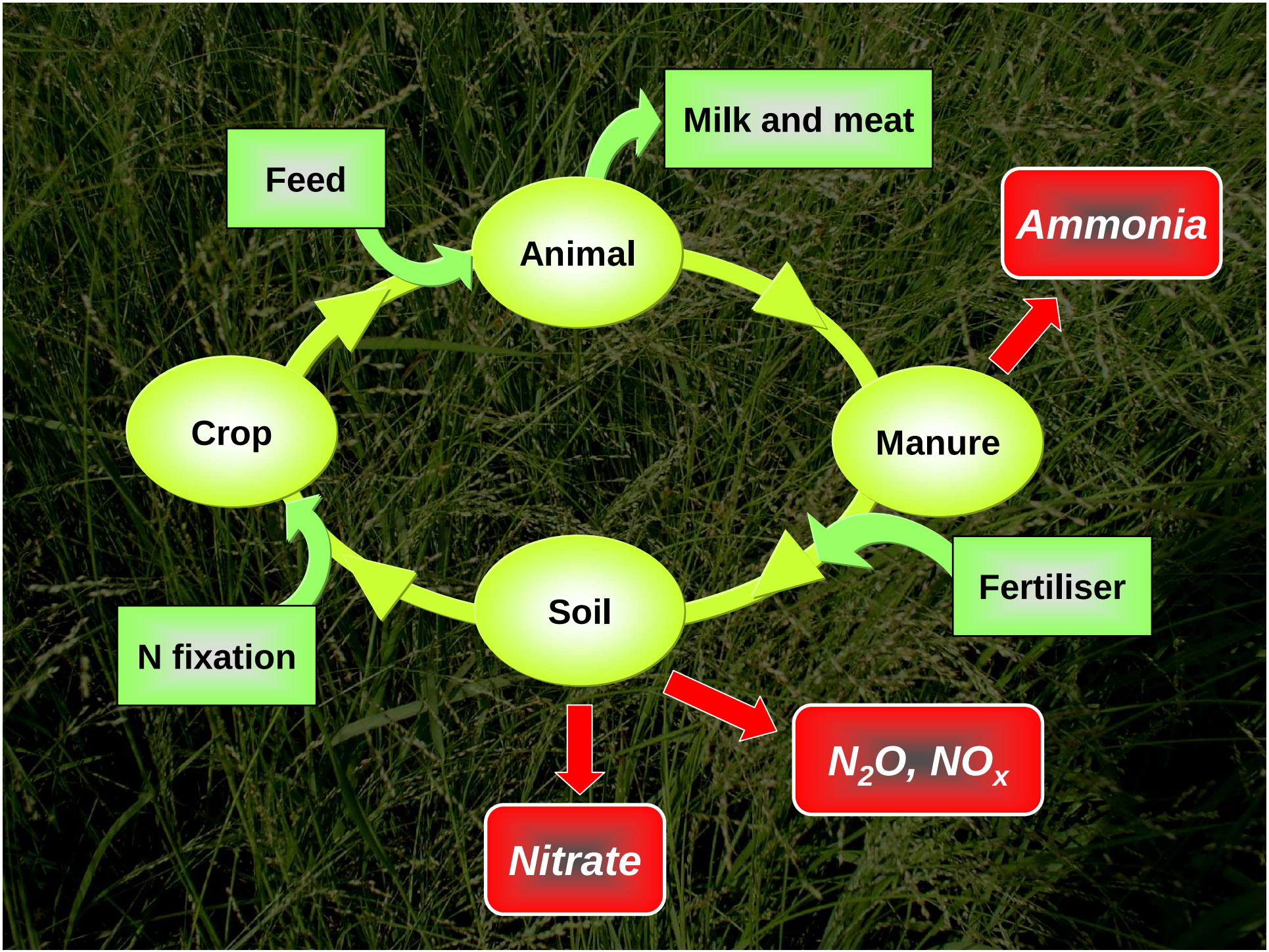
- Develop and communicate a scientifically sound strategy to manage Europe's nitrogen cycle
- Maximise net *economic and societal benefits* of **Nr** use
- Minimise overall *environmental burden* of **Nr**

INTEGRATED APPROACH

Model concept for N: “Leaky pipe”

Oenema et al., 2009




Milk and meat
Feed
Animal
Ammonia
Crop
Manure
Fertiliser
Soil
N fixation
N_2O, NO_x
Nitrate

Manure N increases with increasing N intake

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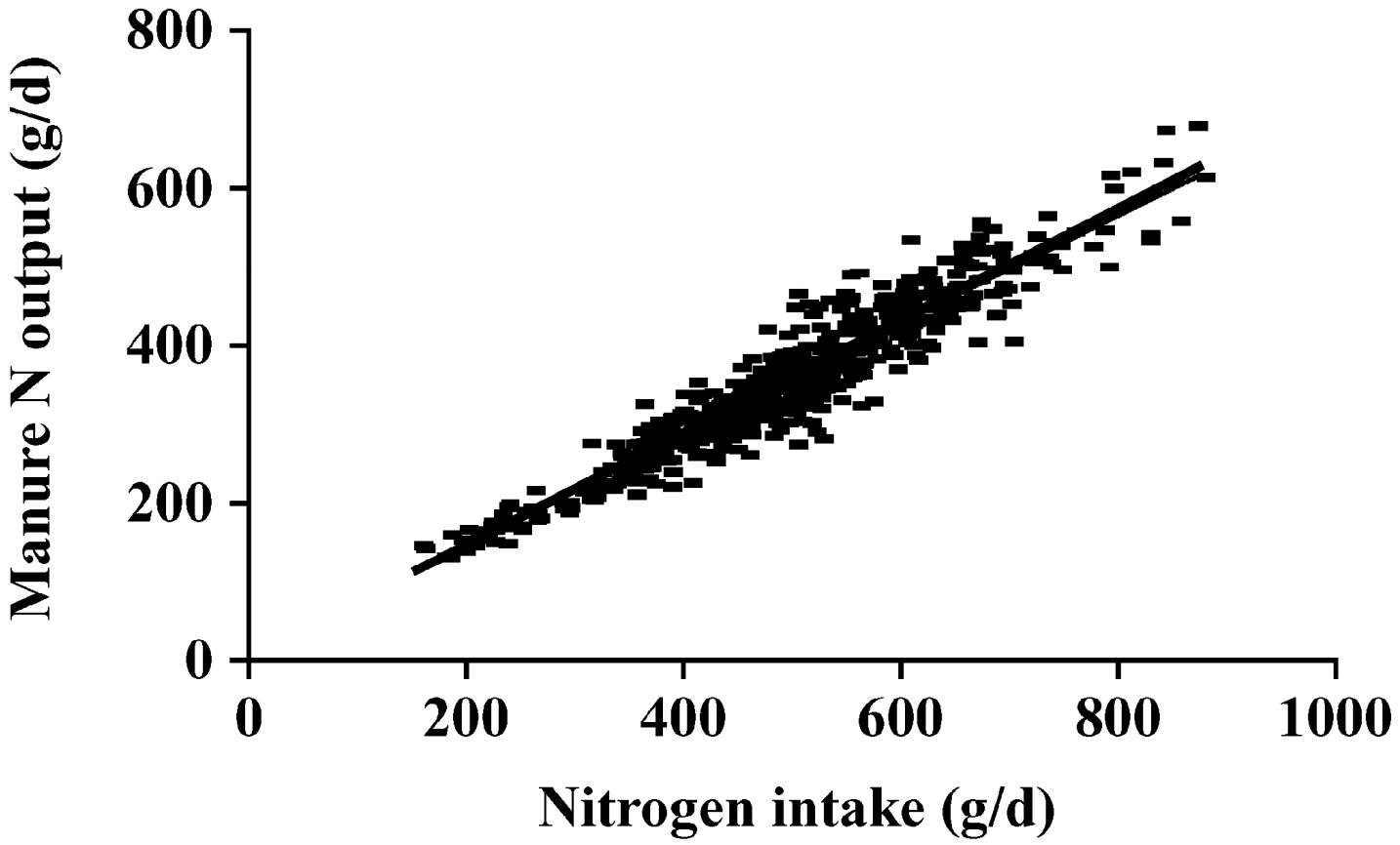
Yan et al., 2006



Manure N increases with increasing milk yield

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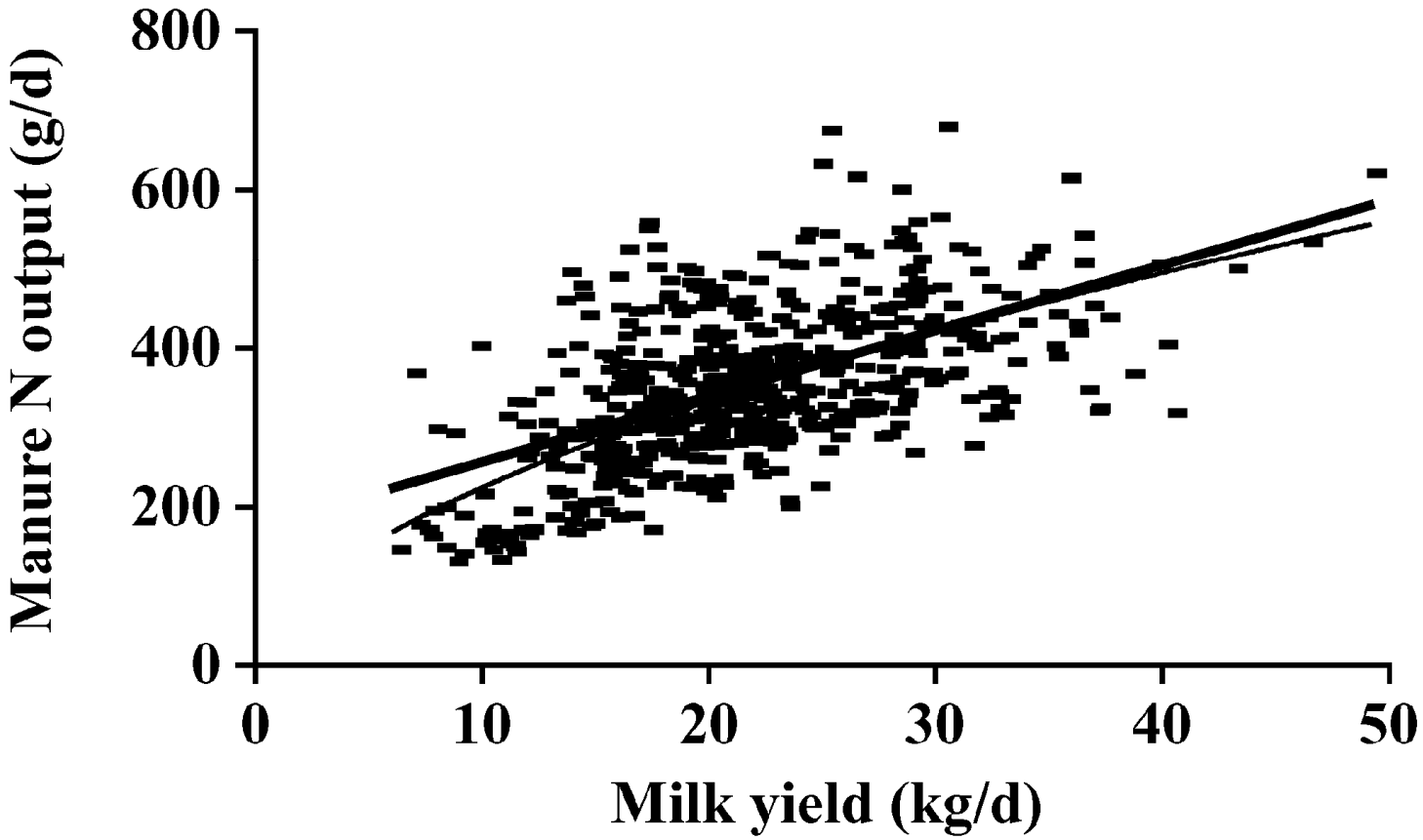
Yan et al., 2006



Dairy production at low N input

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- Optimize milk protein production?
  - Economically
  - Cow welfare, health and reproduction
  - Manure quality – soil fertility
  - Environmental impact
  - Socially acceptable
  - …

Dairy production at low N input

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- Optimize milk protein production?
  - Supply of metabolisable (absorbable) protein
  - Ruminal N loss
  - Use of absorbed protein

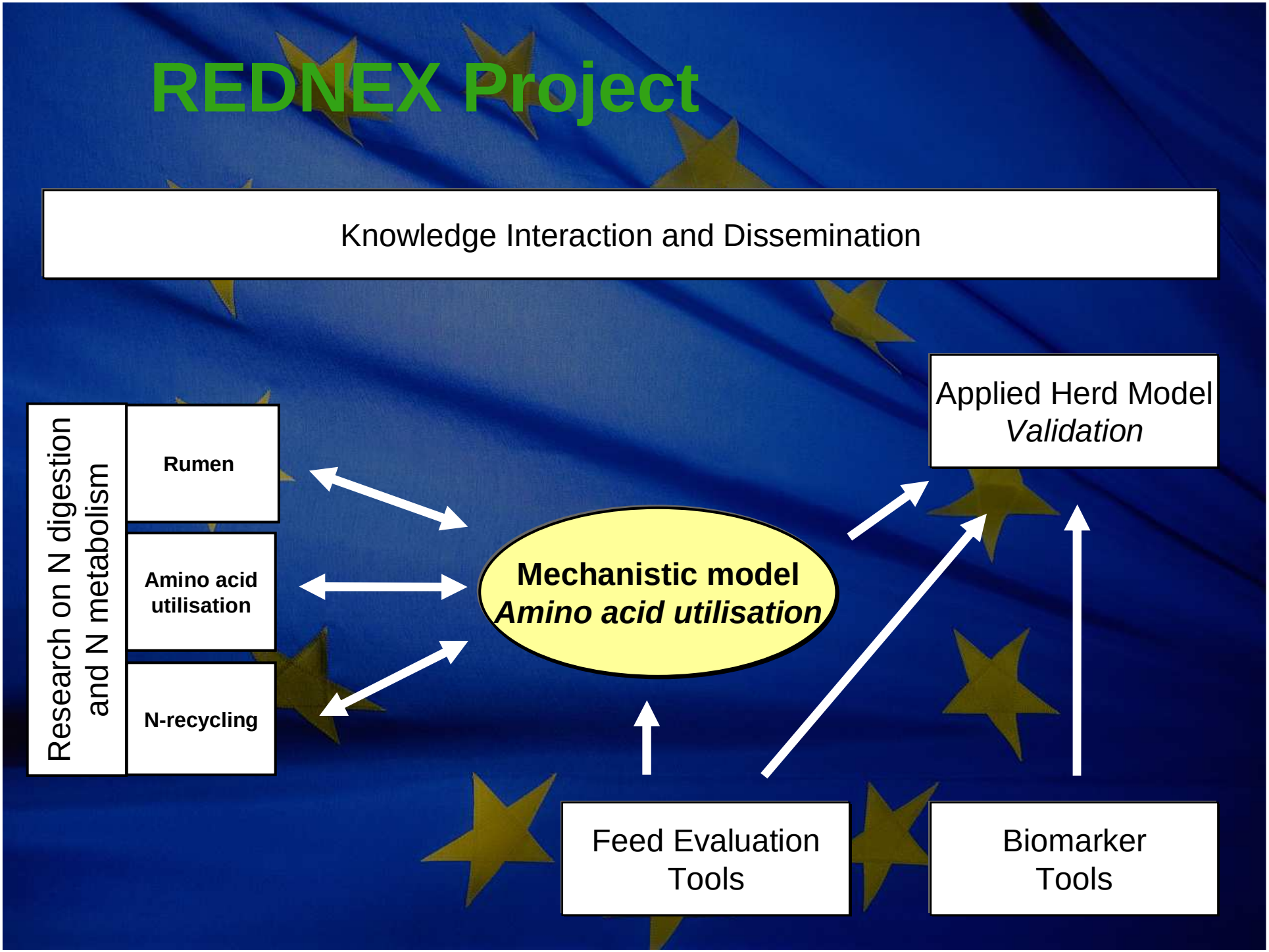
FEEDING STRATEGIES

Tools: - feed evaluation

- reliable predictive models

- monitoring

REDNEX Project



Knowledge Interaction and Dissemination

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- Annual Symposium at EAAP meeting to present REDNEX research to wide audience

- **2008 – Vilnius**
  Nitrogen Utilization and Loss by Dairy Cows
  State of the Art in Modelling and Prediction

  www.rednex-fp7.eu/pgs/Publications.html

- **2009 – Barcelona**
  Protein metabolism and N excretion in dairy cattle

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