Sustainable phosphorus management on dairy farms

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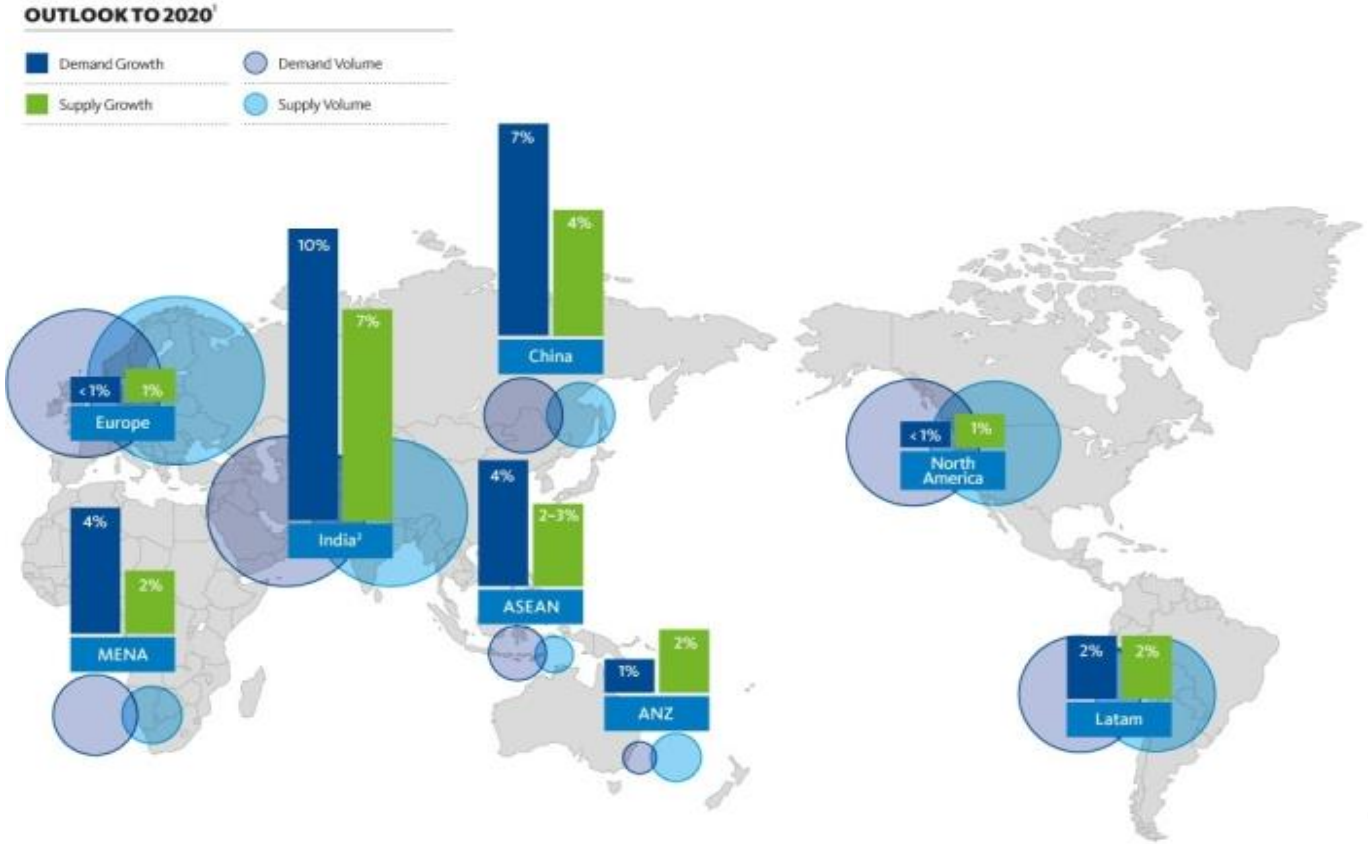
Background

- The EU dairy industry currently accounts for 24.2% of world milk supply (EDA, 2015)
- The industry produces 153 billion litres of milk per annum, equivalent to a production value of €55 billion (EC, 2014)
- Looking to the future two key themes:
  - Volatility
  - Opportunity for growth

Background

- Increasing global demand for dairy products presents a significant opportunity for expansion within the dairy sector



(Fonterra, 2012)

Background

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- Looking to the future two key themes:
  - Volatility
  - Opportunity for growth

Long-term growth in the EU dairy sector can only be achieved improving the sustainability of production systems

Phosphorus use in the dairy sector

- Historically, intensively managed dairy farms have exhibited high P balances (+20kg/ha) due to large inputs of feed and fertiliser P (Haygarth et al. 1998, Novotny, 1999).

- In recent years P surpluses on dairy farms have been falling as a result of rising input prices, increased farmer awareness and legislation.

Phosphorus use in the dairy sector

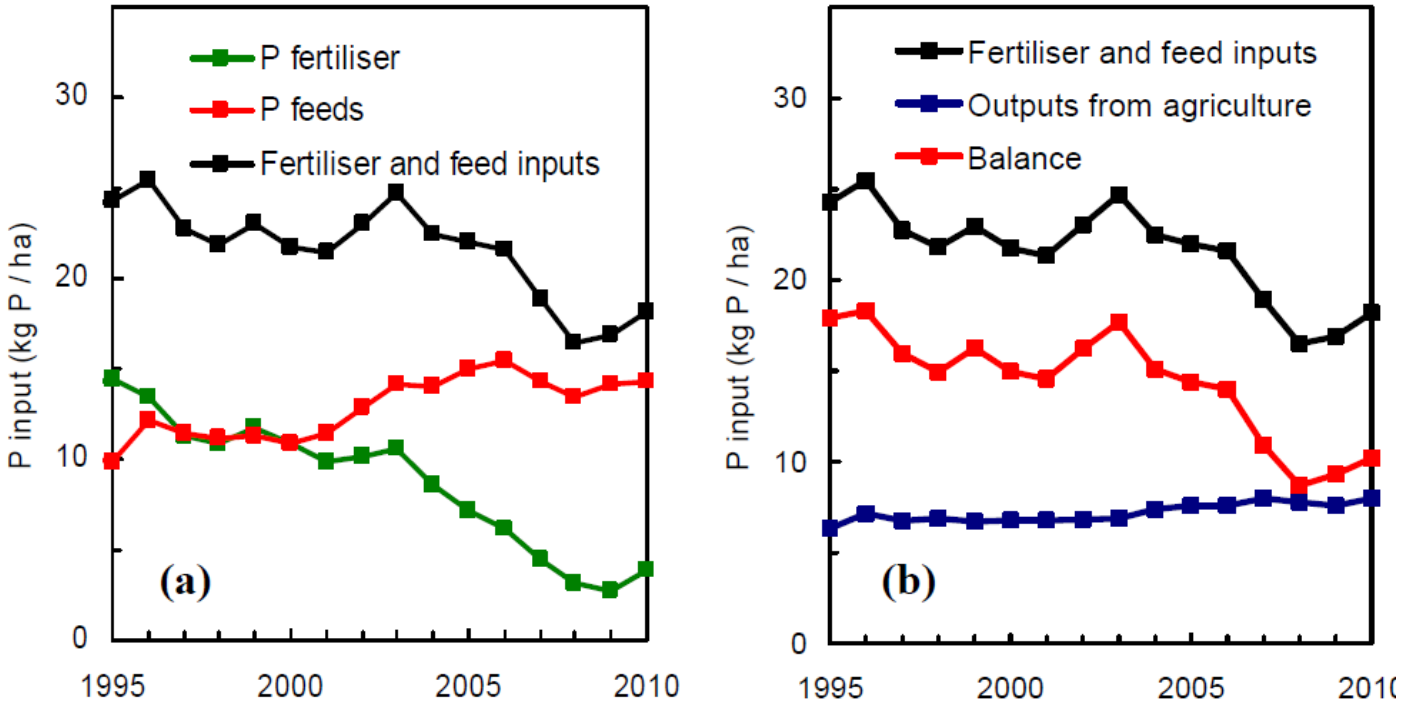


Figure 3.14 *(a) Trends in P inputs to NI farms, and (b) trends in P inputs and outputs and P balances for NI farms (1995-2010)*

(Foy et al . 2011)

Improving P use efficiency on European dairy farms

- Targeting P inputs
- Closing the P cycle
- Minimising environmental impact
- Increasing farmer awareness and engagement

Targeting P inputs on dairy farms

- Improved understanding of P requirements - forages

	Total yield (kg DM/ha/yr)
PRG + Conventional Clover	5698
PRG + Low P Clover	6873

(Lloyd et al. 2014)

Targeting P inputs on dairy farms

- Improved understanding of P requirements - livestock

Targeting P inputs on dairy farms

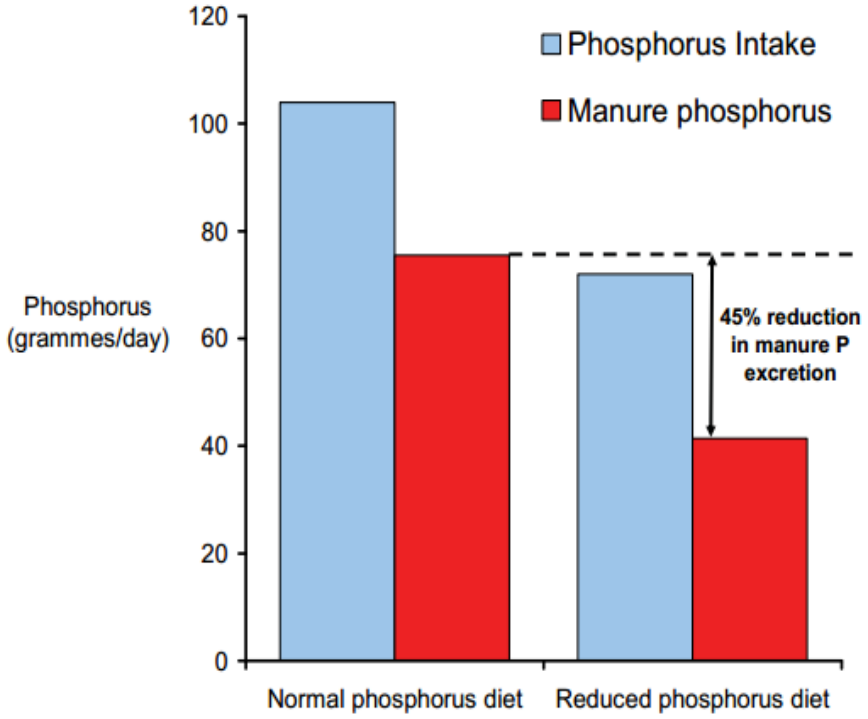
- Research has highlighted scope to reduce P in dairy cow diets

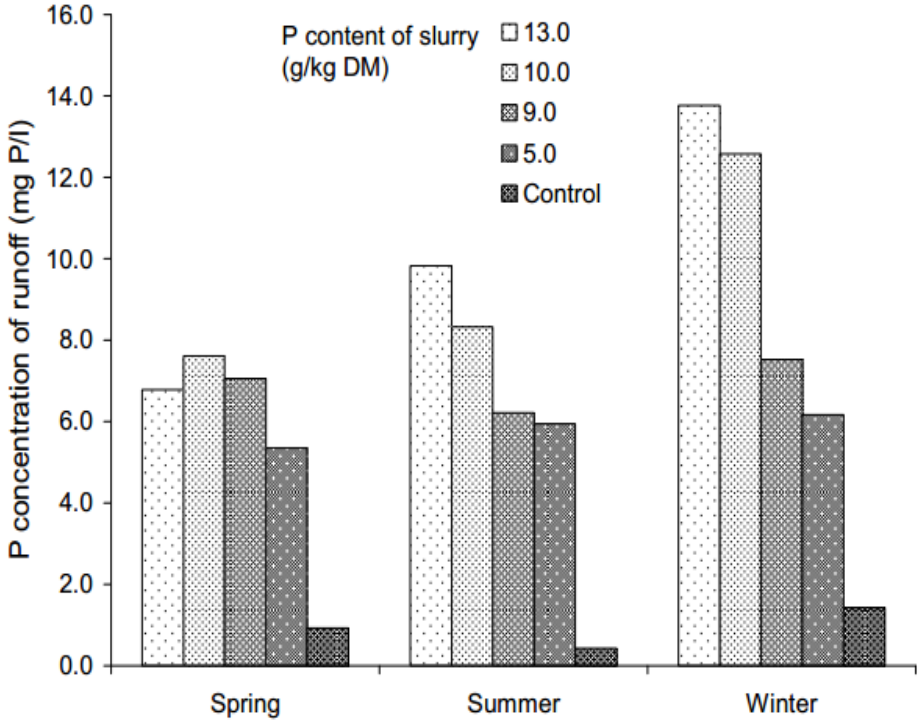
	Normal P (4.5 g/kg DM)	Reduced P (3.6 g/kg DM)
Cow dry matter intake (kg/cow/day)	20.3	19.9
Milk yield (kg/cow/lactation)	8485	8522
Time to first heat (days)	23	25
Conception to first and second service (%)	67	60

(Ferris et al. 2010)

Targeting P inputs on dairy farms

- Reduced P in manures

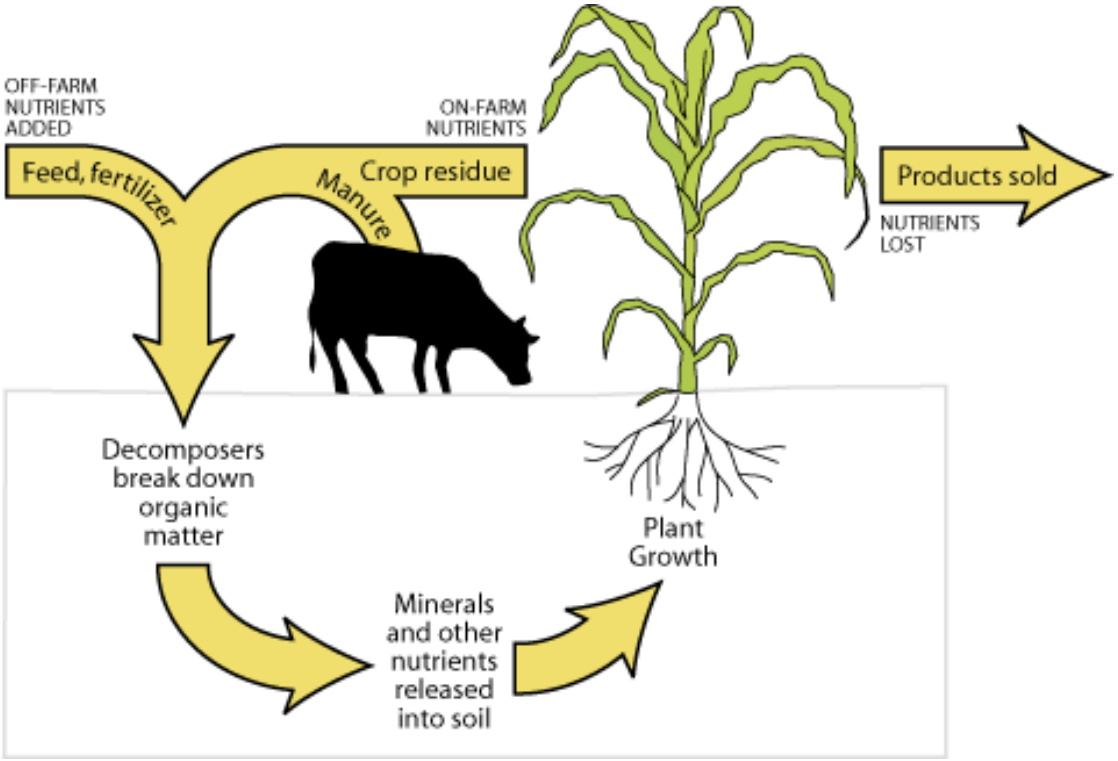




(Ferris et al. 2010)

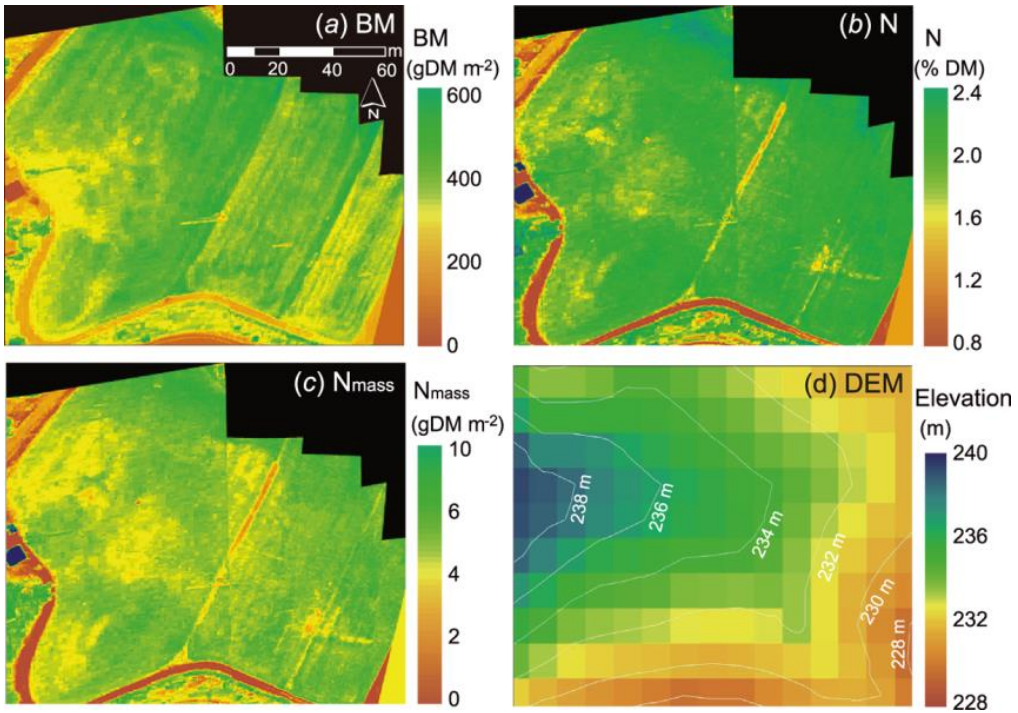
Targeting P inputs on dairy farms

- Do we understanding fully the implications of altering P stores on farm?



Targeting P inputs on dairy farms

- Exploiting precision application and recording techniques

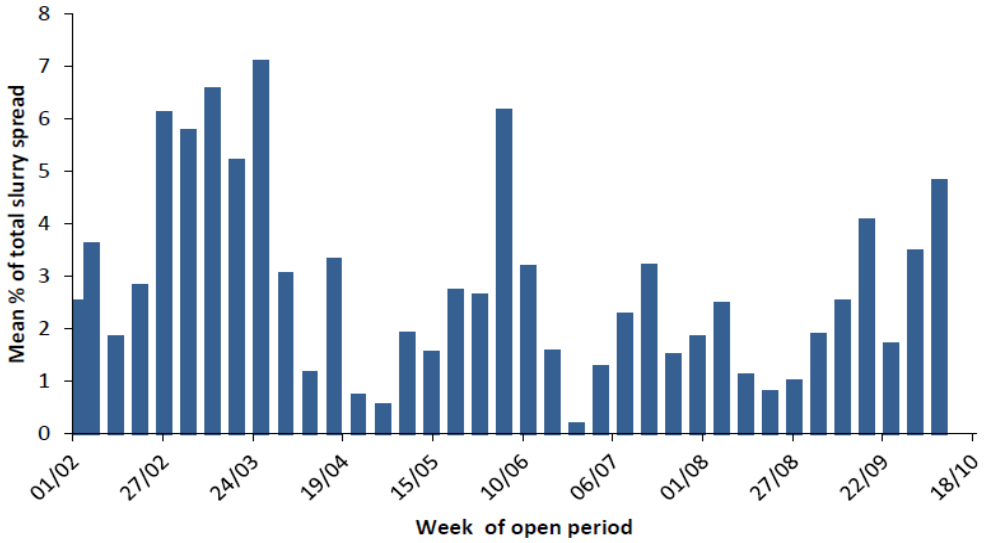


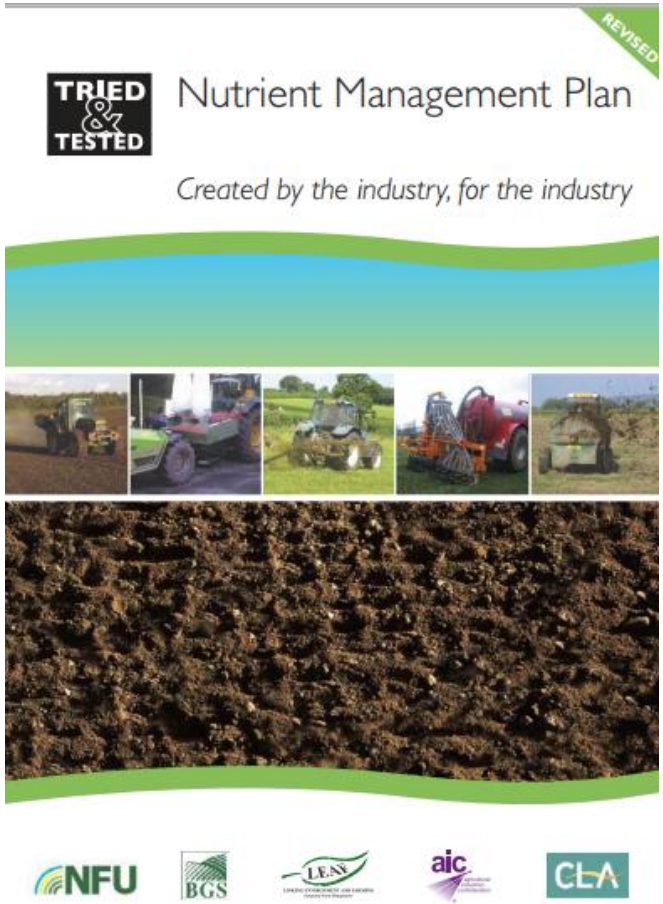
Closing the P cycle

- Manures remain a significant store of P on dairy farms
- Technological developments in low cost options for manure processing and storage (e.g. slurry separation) have aided manure P recycling
- Increased awareness and testing of manure P content
- Greater role for cost effective manure processing strategies to improve recovery P from manures

Minimising environmental impact

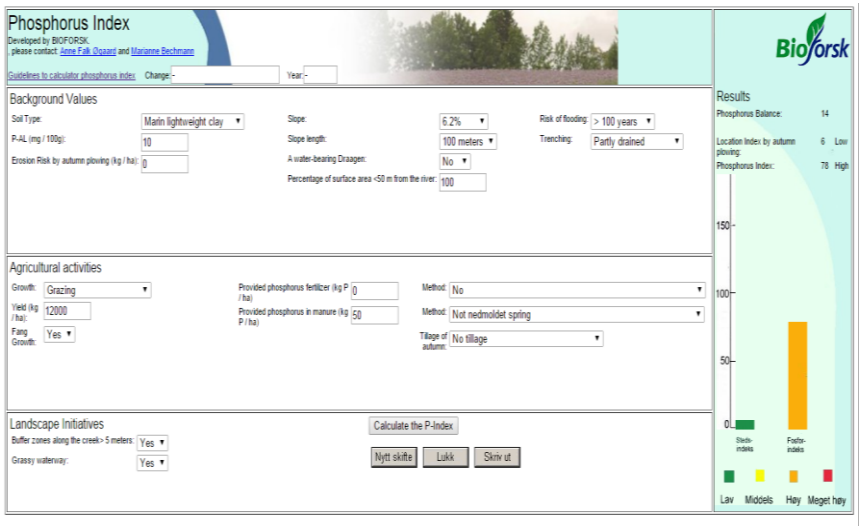
- Greater adoption of strategies and awareness of 4R's within industry





Minimising environmental impact

- Greater adoption of strategies and awareness of 4R's within industry
- Development of farmer facing tools and support to improve awareness of environment-agriculture interactions



Increasing farmer awareness and engagement

- Greater development of metrics and recording systems to encourage benchmarking of PUE within and between farms

- Collaborative industry-wide KT initiatives to provide support for farmers

P-test

Name	P. Test
Address	Demo
Postcode, place	Demo

% big breeds	100
% small breeds	0
% cross-bred	0
Total	100
Youngstock <1 yo	40
Youngstock 1-2 yo	33

Produced milk kg/year	736500
Fat %	4.45
Protein %	3.5
Urea content (mg/100g)	22

	Current situation Limited grazing (>6 hr/day grazing)	New situation*) Very limited grazing (<6 hr/day)
Year-round diet composition		
Grazing %	9	9
Grass silliage %	40	40
Cut maize %	51	51
Other	0	0
ME/kg DM	948	953
P g/kg DM	4.2	3.4
RE g/kg DM	166	148
Concentrates incl. by-products cow (kg/DM)	2197	2197
Concentrates incl. by-products (kg DM/100 kg cow milk)	29.8	29.8
P-efficiency %	26.5	33.7

*) The new situation assumes a constant herd milk production per cow compared to the current situation

Compare with other businesses:	
in you region	29
with a comparable ration	32
target for 2011	30
target for 2013	31

Conclusions

- The European dairy sector has made significant strides to improve the efficiency of P use on farm through investment in research, technology and effective knowledge transfer
- Further progress can be achieved by:
  - Improving recording systems and supplying realistic metrics for monitoring PUE
  - Engaging with new technologies to deliver targeted P inputs
  - Improving our understanding of P availability and degradability in the farm P cycle and evaluating the impact of reducing P surpluses
  - Identifying cost-effective methods for facilitating recovery of P from animals manures
- Industry, researchers and farmers must collaborate effectively to support this progress.

Vision for the future

- **Targeted P inputs:** A sector that better understands P requirements of crops and animals and embraces existing and new measurement techniques to better target P inputs.

- **Closing the P cycle:** Recovered and recycled ‘fertilizer-grade’ products which substitutes imported rock-phosphate derived fertilizers and feed supplements.

- **Minimising environmental impact:** A sector that is actively involved in strategies to minimise environmental impact of the dairy sector while recognising the requirements of profitable production.

- **Increasing farmer awareness and engagement:** A progressive sector that is proactive in creating and encouraging uptake of tools, metrics and emerging technologies to meet farmer needs towards more sustainable P use.