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

• The EU dairy industry currently accounts for 24.2% of world milk supply (EDA, 2015)

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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

<table>
<thead>
<tr>
<th></th>
<th>Total yield (kg DM/ha/yr)</th>
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<tbody>
<tr>
<td>PRG + Conventional Clover</td>
<td>5698</td>
</tr>
<tr>
<td>PRG + Low P Clover</td>
<td>6873</td>
</tr>
</tbody>
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(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

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

(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 understand 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
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.