IMPROVING DAIRY FARM NITROGEN AND PHOSPHORUS USE:
OPPORTUNITIES AT THE FARM SCALE

Cameron Gourley and Sharon Aarons
Increasing stocking rates
- litres per cow

Increasingly reliant on external inputs:
- purchased feed
- nitrogen fertiliser

Significant intensification in past 20 years
Accounting for Nutrients

Improve our understanding of nutrient flows, transformations, use efficiencies, balances, and potential losses on Australian dairy farms.

Nutrient flows and transformations

INPUTS
- Feed
- Animals
- Bedding
- Seed
- Fertilizer
- N fixation
- Irrigation
- Precipitation
- Manure

Within Farm
- Dairy cows
- Manure
- Pasture / crops
- Soil

OUTPUTS
- Milk
- Animals
- Manure
- Crops
- Silage, hay
- Runoff

LOSSES
- Gaseous
- Leaching
- Soil accumulation
- Runoff

ACCOUNTING FOR NUTRIENTS ON AUSTRALIAN DAIRY FARMS
Crude Protein % of Ryegrass

Number of samples

Crude Protein %

0 5 10 15 20 25 30 35 40

0 15 29 43 57 71 85 99 113 127 141 155 169 183 197 211 225

Phosphorus content (%) of Ryegrass

Number of samples

Phosphorus content %

0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9

0 15 29 43 57 71 85 99 113 127 141 155 169 183 197 211 225

Feed

Dairy cows

Pasture / crops

Manure

Soil

87%

76%
Feed N and P use efficiency and daily loads excreted by lactating cows from 43 dairy farms over 5 visits

<table>
<thead>
<tr>
<th>Efficiency of nutrient utilisation (%)</th>
<th>N</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>20.8</td>
<td>25</td>
</tr>
<tr>
<td>Minimum</td>
<td>10.5</td>
<td>10.7</td>
</tr>
<tr>
<td>Maximum</td>
<td>35.1</td>
<td>48.5</td>
</tr>
</tbody>
</table>

Aarons et al. 2010
Accounting for all inputs

Spatially and temporally targeted

Better balanced intakes

Storage infrastructure and management

Better manure collection

Improved distribution