Manure and it’s Management – focus on cattle slurry
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Manure management is ultimately about growing a crop with the nutrients. Meeting the challenge of getting the correct nutrient rate on each field for each crop.

Land is expensive – if we don’t get nutrient rate correct every time it is costing money.
Questions

1. **What’s the target crop?**
   - Determines the nutrient maintenance rate

2. **What’s the soil status?**
   - Determines the nutrient build-up rate

3. **What’s the slurry nutrient content?**
   - Determines application rate/volume
   - Determines purchased mineral fertiliser rate

4. **What’s the application method?**
   - Affects the retained N

5. **How can I get the rate right?** Example
Effect of target crop & soil status on P & K requirement

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Soil Status

Do you use soil tests to decide where to spread slurry?
(n=149) P. Berry (2013)

Percentage of respondents (%)

<table>
<thead>
<tr>
<th>Answer</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>48%</td>
<td>52%</td>
</tr>
</tbody>
</table>

P. Berry (2013)
Where?

Return to silage ground **guided by soil test**

But why?

<table>
<thead>
<tr>
<th>Index</th>
<th>Status</th>
<th>P (mg/l)</th>
<th>K (mg/l)</th>
<th>P &amp; K fertiliser plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Very low</td>
<td>&lt;3.0</td>
<td>&lt;50</td>
<td>Build up + Maintenance</td>
</tr>
<tr>
<td>2</td>
<td>Low</td>
<td>3.1-5.0</td>
<td>51-100</td>
<td>Build up + Maintenance</td>
</tr>
<tr>
<td>3</td>
<td>Adequate</td>
<td>5.1-8.0</td>
<td>101-150</td>
<td>Maintenance</td>
</tr>
<tr>
<td>4</td>
<td>High</td>
<td>&gt;8.0</td>
<td>&gt;150</td>
<td>No P/K fertiliser</td>
</tr>
</tbody>
</table>
Nutrient variability

Do you vary rate according to differences between slurries? (n=125) (P. Berry, 2013)
Nutrient variability?

Large variability between farms
Between high and low:

- NH$_4$: 17 fold difference
- P: 11 fold difference
- K: 15 fold difference

For comparison imagine going to the supplier a to buy a tonne of fertiliser – let’s say 10:10:20

BUT: no label and the information is, well its somewhere between: 1:2:3 14:12:24

Range of nutrient content found in Teagasc Johnstown Castle slurry survey (Berry, 2013)
How can I know the “label” for my slurry?

1. Collect sample after tank agitation, safest from the spreader
2. Place in tall container
3. Place hydrometer in and allow time to find level/dilute
Take your DM value and read off table below
Print yours! Google Teagasc Green Book
it’s on page 46!

Table 9-8: Typical available N, P, and K applied (kg/ha)\(^1,2,3,4\) depending on cattle slurry dry matter content and application rate\(^4\)

<table>
<thead>
<tr>
<th>Slurry Application Rate</th>
<th>4% DM Slurry</th>
<th>6% DM Slurry</th>
<th>8% DM Slurry</th>
<th>10% DM Slurry</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N(^2)</td>
<td>P(^3)</td>
<td>K(^3)</td>
<td>N(^2)</td>
</tr>
<tr>
<td>11 t/ha</td>
<td>5</td>
<td>4</td>
<td>23</td>
<td>8</td>
</tr>
<tr>
<td>22 t/ha</td>
<td>11</td>
<td>7</td>
<td>47</td>
<td>15</td>
</tr>
<tr>
<td>33 t/ha <strong>highlight</strong></td>
<td>16</td>
<td>11</td>
<td>70</td>
<td>23</td>
</tr>
<tr>
<td>44 t/ha</td>
<td>21</td>
<td>15</td>
<td>93</td>
<td>31</td>
</tr>
<tr>
<td>55 t/ha</td>
<td>27</td>
<td>18</td>
<td>116</td>
<td>38</td>
</tr>
</tbody>
</table>
How can I know the “label” for my slurry?

Use hydrometer/estimate and cross check with lab

BUT is it expensive?

- About €60 per sample
- 16 weeks storage for 90 dairy cows is 475 t of slurry
- If you were buying €2000 of fertiliser would you accept no nutrient label?
Have you ever had the nutrient content of your slurry analysed in a lab? (n=155)

- Yes: 8%
- No: 92%

Potential measure for improving Farm nutrient use efficiency
Discussion Group? Industry Sustainability initiative?
## Slurry N, P, K – Things to know

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>P</th>
<th>K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gaseous loss phase?</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Atmospheric conditions?</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Application method?</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Spread pattern?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

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Application method – affects N loss/ N retention

Splash plate

Loss of 34 to 83% of available N
Average loss: 54%
Average retained: 46%

Trailing shoe

Loss of 11 to 68% of available N
Average loss: 35%
Average retained: 65%
Growth rates increasing strong nutrient uptake

Bridge gap to spring growth with storage – Nervous about spreading bought fertiliser? Think about slurry nutrients the same way

On average lower N loss as NH3
Cattle slurry **Nitrogen (N)** application rate at 33t/ha (3000gal/ac) as affected by slurry dry matter, method of application

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Forrestal, P.J. 2018
Targeting slurry P & K to Index 1 & 2 soils

Why?

- The slurry P & K is already on the farm – target to where it will give the most benefit
- Only 50% of slurry P is counted at index 1 & 2 compared to 100% of the mineral P
- Target index 1 & 2 with slurry to increase farm mineral fertiliser P allowance
Getting Phosphorus (P) right

Estimated cattle slurry Phosphorus (P) application rates at 33t/ha (3000gal/ac) as affected by dry matter

P maintenance rate for 1st cut silage on Index 3 soils  
c. 4 kg P/ha

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Getting Potassium (K) right

Estimated cattle slurry Potassium (K) application rates at 33t/ha (3000gal/ac) as affected by dry matter

K maintenance rate for 1st cut silage on Index 3 soils

K application rate (kg/ha)

Slurry dry matter content (%)
In this example 1\textsuperscript{st} cut at Index 3

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>P</th>
<th>K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintenance</td>
<td>125</td>
<td>20</td>
<td>125</td>
</tr>
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*Typically no more than 90 kg K/ha applied at closing for silage*
Key Messages

Need a field by field prescription for success

a) Test soil

b) Test slurry

c) Use low emission spreader to retain N

d) Balance slurry with correct mineral fertiliser
Low emission spreaders used

- More N retained to grow grass
- Reduced farm fertiliser N bill
- Less grass contamination option to spread grazing paddocks
- More even application of slurry N, P, K
- Less odour
- Helping to meet the national Ammonia emission reduction commitments