Low emission slurry application technology: a research, advisory and farmer perspective

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Knowledge Exchange to Encourage Adoption of Low Emission Slurry Application Technology Northern Ireland:

• Actors involved
• Background to the work
• Cafre knowledge exchange processes
• Knowledge exchange actions
• Outcomes from the work
Actors Involved

- Agri-Food & Biosciences Institute (AFBI) – slurry research
- Agrisearch – research funding
- College of Agriculture, Food and Rural Enterprise (CAFRE) – knowledge exchange demonstrations and training
- Ulster Farmers Union (UFU) – member encouragement
- Department of Agriculture, Environment and Rural Affairs (DAERA) Policy – capital grant funding
Background

- AFBI Research - Trailing Shoe slurry application (Dr P Frost)
- Nitrates Directive negotiations
  - Slurry nitrogen (N) use efficiency
- Slurry N efficiency - EU Commission paper (Dr J Bailey 2005)
- Nitrates Directive Action Plan measures and DAERA initiatives
  - Closed period
  - Slurry storage capacity
  - Improved slurry spreading technology (target 33% cattle & pig slurry)
  - Technology demonstration and training (CAFRE)
  - METS (Manure Efficiency Technology Scheme)
• Education Service
  • Agriculture, Horticulture, Veterinary Nursing (Greenmount Campus)
  • Food Technology (Loughry) Campus
  • Equine (Enniskillen Campus)

• Development Service
  • Business Development Groups
  • Benchmarking
  • Training/Technology Transfer
  • Technology Adoption
The CAFRE Knowledge Exchange Process

Investigation → Initiation → Demonstration & Training → Adoption
The CAFRE Knowledge Exchange Process

Investigation

Initiation

Demonstration & Training

Adoption

- HOB approval
- Peer review & KTT board approval
- Peer review & KTT board approval
- KTTQMS Technology & Advisory team reviews
Knowledge Exchange Demonstrations

- DARD/UFU – Greenmount Campus 2004
- AFBI/CAFRE – Hillsborough 2006 (500+ farmers attended)
- Local farm events 2007-2010 (30+ events)
Slurry Application Technology

• Ploughing in
• Deep injection
• Shallow injection
• Trailing shoe
• Band spreading
• Splash plate
AFBI Hillsborough Research – Quantifiable Benefits:

Traditional Splash Plate vs Trailing Shoe/Band Spreading

(results from 23 harvests over 3 years)

<table>
<thead>
<tr>
<th>Application method</th>
<th>Trailing shoe</th>
<th>Band spreading</th>
</tr>
</thead>
<tbody>
<tr>
<td>*Available N utilisation change (%)</td>
<td>25</td>
<td>10</td>
</tr>
<tr>
<td>*Grass yield change (%)</td>
<td>26</td>
<td>18</td>
</tr>
<tr>
<td>**Reduced P runoff (%)</td>
<td></td>
<td>27 to 37</td>
</tr>
</tbody>
</table>

*Frost (2007) Occasional publication No. 38, British Grassland Society

**McConnell (2012) Journal of Environmental Quality
### Fertiliser Savings

<table>
<thead>
<tr>
<th>Slurry Application System</th>
<th>Splash Plate</th>
<th>Trailing Shoe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application rate (m³/ha gal/acre)</td>
<td>50 (4500)</td>
<td>50 (4500)</td>
</tr>
<tr>
<td>Available N from slurry (kg N/ha)</td>
<td>30</td>
<td>57</td>
</tr>
<tr>
<td>N from bagged fertiliser (kg N/ha)</td>
<td>70</td>
<td>43</td>
</tr>
<tr>
<td>Total N available (kg N/ha)</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>*Savings in fertiliser cost (£/ha)</td>
<td>-</td>
<td>£30 (£12/acre)</td>
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*Calcium Ammonium Nitrate (27% N) @ £300/tonne
Cost Benefit Analysis

Trailing Shoe vs Splash Plate:

- 25% increase in contractor spreading costs
- 10% reduction in work-rate (P Frost, AFBI)
- £10 per hectare saving over extra spreading costs
- Farm scale to justify? - 300 dairy cows (without grant aid)
Non-Quantifiable Benefits:

• Higher application rates to silage areas

• More even application & less grass contamination

• Wider spreading window - up to 4 weeks after cutting

• Spreading within 3.0m of watercourse rather than 10.0m

• Reduced odour
Knowledge Transfer
Farmer concerns relayed to AFBI

- Rowing up of residual slurry trash
- Grass dieback along slurry line
- Impact on soil worm content
- Impact of multiple applications each season
METS
Manure Efficiency Technology Scheme

• Competitive scheme
• Key criterion: volume spread/financial benefit
• Farmer co-operation encouraged (Group applications)
• Online application system
• Industry briefings:
  - UFU/NIAPA
  - Banks
  - Farmer seminars
• Post-grant aid CAFRE training
• Farmers grant aided: 307 items of slurry equipment

• Funding provided: £2.9M

• Online application: 96%

• Estimated slurry volume spread by alternative means - 33%*

*Survey of slurry spreading practices in N. Ireland, AFBI, 2013