Dataman
Improving national GHG inventories for manure management

Tony van der Weerden
AgResearch
New Zealand

Photos courtesy of Koki Maeda
Dataman: Impact & Objectives

**IMPACT:** Access to the most up-to-date knowledge on managing manure GHG

- Publicly accessible GHG database
- Mitigation options identified
- Guidelines on improving inventories
- Relationships between key variables and EFs identified

**Key Output:** Improved decision-making for managing manure GHG
Publicly available database
Project Partners

New Zealand
UK
Ireland
Denmark
France
Germany
Netherlands
Chile
Australia
Project Partners

Argentina
Belgium
Brazil
Canada
China
Colombia
Italy
Kenya
Nicaragua
Norway
Japan
Sweden
Switzerland
Vietnam
Zimbabwe
Project Partners

Ignacio Beltran
Post-doc based at INIA (Chile)
GHG emissions from manure management

Methane (CH$_4$)
- anaerobic lagoons, liquid and slurry storage

Nitrous oxide (N$_2$O)
- solids and slurry storage (semi-anaerobic), deep bedding, land application, excreta from grazing.

Ammonia (NH$_3$) – indirect source of N$_2$O
- livestock housing, manure storage, land application, excreta from grazing
GHG emissions along the manure management chain

- Systems approach
- From Housing to Storage to Land application, including animal grazing
- Example shown for liquid manure management

Modified from Sajeev et al. 2017
Approach and progress

Database Construction
- Key factor selection
- Database formation
- Database collation

Statistical analysis & modelling
- Develop functional relationship
- Emissions from housing / storage
- Emissions from manure / excreta on soils

Inventory Refinement
- Inventory improvements
- Recommendations for future improvements
- Dissemination
Database description
Combines existing databases and individual studies

<table>
<thead>
<tr>
<th>GHG</th>
<th>Housing (emission rate)</th>
<th>Storage (emission rate or cumulative loss)</th>
<th>Field (emission factors)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NH₃</td>
<td>1414</td>
<td>668</td>
<td>1476</td>
</tr>
<tr>
<td>N₂O</td>
<td>329</td>
<td>291</td>
<td>2469</td>
</tr>
<tr>
<td>CH₄</td>
<td>368</td>
<td>453</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Country</th>
<th>Housing</th>
<th>Storage</th>
<th>Field</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Australia</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brazil</td>
<td>✓   ✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td>✓</td>
<td>✓   ✓</td>
<td></td>
</tr>
<tr>
<td>Chile</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>China</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Colombia</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Kenya</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Denmark</td>
<td></td>
<td>✓   ✓</td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>✓   ✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Germany</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Ireland</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Italy</td>
<td>✓   ✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Netherlands</td>
<td>✓   ✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Nicaragua</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Norway</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>NZ</td>
<td>✓</td>
<td>✓   ✓</td>
<td></td>
</tr>
<tr>
<td>UK</td>
<td>✓</td>
<td>✓   ✓</td>
<td></td>
</tr>
<tr>
<td>Sweden</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Switzerland</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Vietnam</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Zimbabwe</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>
Value to developing countries

- General guidelines for improving national inventories
- Refined emission factors for specific livestock farming practices
- Mitigation options identified – can be applied at farm-scale

Photos courtesy of Koki Maeda
Next steps

Dataman

• Continue data collation and analysis, conduct case studies (NZ, Chile), guidelines

MELS

Mitigating GHG Emissions from Livestock Systems

• Dataman research extended to 2022, funded via Era-Net Joint Call 2018
• Includes developing a prototype farm-scale decision support tool
A personal invitation to you!

“We need more data!” (my statistician)

Why?
• Richer database
• Broader range of manures
• Broader range of soils
• Broader range of climates.

Improves our ability to:
• refine emission factors
• identify key drivers and
• evaluate additional mitigation and technology options (e.g. harnessing biogas for energy, improving nutrient use efficiency)

Contact me at tony.vanderweerden@agresearch.co.nz
Acknowledgements

**Fellow research team members:** Marta Alfaro, Barbara Amon, Ignacio Beltran, Cecile de Klein, Maguy Eugene, Peter Grace, Karin Groenestein, Sasha Hafner, Melynda Hassouna, Nicholas Hutchings, Dominika Krol, Koki Maeda, Alasdair Noble, Francisco Salazar, Rachel Thorman

**DataMan Funding:**
- NZ Govt via Global Research Alliance (NZ and Chilean scientists)
- UK Govt via Defra (UK scientists)
- In-kind support from other European institutes (INRA, ATB, Aarhus University, Teagasc, WUR)

**Researchers** for publishing research findings and directly supplying to project